I-7243D
MODBUS TCP Server/DeviceNet Master Gateway

User's Manual

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1. General Information

1.1 DeviceNet Introduction

The CAN (Controller Area Network) is a serial communication protocol, which efficiently supports distributed real-time control with a very high level of security. It is an especially suited for networking "intelligent" devices as well as sensors and actuators within a system or sub-system. In CAN networks, there is no addressing of subscribers or stations in the conventional sense, but instead, prioritized messages are transmitted. DeviceNet is one kind of the network protocols based on the CAN bus and mainly used for machine control network, such as textile machinery, printing machines, injection molding machinery, or packaging machines, etc. DeviceNet is a low level network that provides connections between simple industrial devices (sensors, actuators) and higher-level devices (controllers), as shown in Figure 1.1.

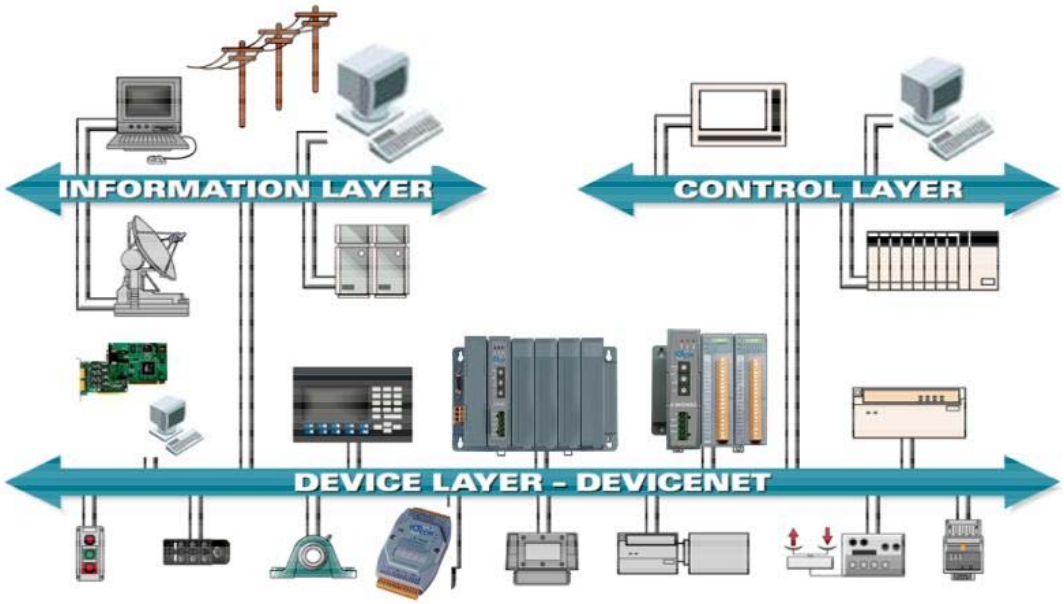


Figure 1.1 Example of the DeviceNet network

DeviceNet is a cost effective solution to one kind application of control c\area network. It reduces the connection wires between devices and provides rapid troubleshooting rejection function. The transfer rate can be up to 500Kbps within 100 meters. The transfer distance can be up to 500 meters in 125Kbps (See Table 1.1). It allows direct peer to peer data exchange between nodes in an organized and, if necessary, deterministic manner. Master/Slave connection model can be supported in the same network. Therefore, DeviceNet is able to facilitate all application communications based on a redefine a connection scheme. However, DeviceNet connection object strands as the communication

path between multiple endpoints, which are application objects that is needed to share data.

Baud rate (bit/s)	Max. Bus length (m)
500 K	100
250 K	250
125 K	500

Table 1.1 The Baud rate and the Bus length

1.2 DeviceNet Applications

DeviceNet is the standardized network application layer optimized for factory automation. It is mainly used in low- and mid-volume automation systems. Some users have also implemented DeviceNet for machine control systems. The main DeviceNet application fields include the following application area (For more information, please refer to www.odva.org):

- Production cell builds and tests CPUs
- Beer brewery
- Equipment for food packing
- Fiberglass twist machine
- Sponge production plant
- Isolation wall manufacturing
- Overhead storage bin production
- Pocket-bread bakery
- Dinnerware production
- HVAC module production
- Textile machines
- Trawler automation system
- LCD manufacturing plant
- Rolling steel door production
- Bottling line
- Tight manufacturing

1.3 Module Characteristics

"Embedded Internet" and "Embedded Ethernet" are hot topics today. Nowadays the Ethernet protocol becomes the de-facto standard for local area network. Via Internet, connectivity is occurring everywhere, from home appliances to vending machines to testing equipment to UPS…etc. Using Ethernet for network in industrial area is appealing because the required cabling is already installed.

The I-7243D from ICP DAS is a solution that provides a communication protocol transfer the DeviceNet to Modbus/TCP protocol and solves a mission-critical problem: connecting an existing DeviceNet network to Ethernet-base PLCs and PC-based configuration and monitor system. It enables DeviceNet networks to be coupled together over the Internet/Ethernet, whereby remote monitoring and control is possible.

The I-7243D can be a DeviceNet master device in the CAN bus on the DeviceNet network. It provides "Predefined Master Connection Set", and supports Group 2 only Server functions to communication with slave devices. On the Ethernet network, it acts as a Modbus TCP server. Users can use Modbus TCP class 0, class 1 and partial class 2 function to communicate with it. In addition, we also provide Utility software for users to configure their device parameters for the I-7243D. The following figure shows the application architecture for the I-7243D.

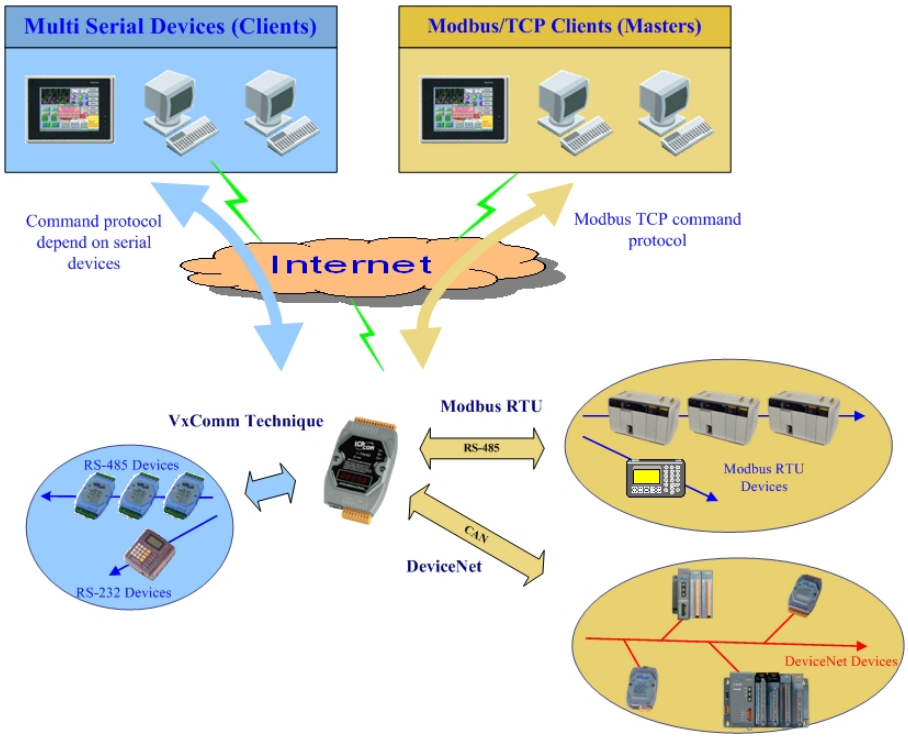


Figure 1-2: Application of I-7243D

1.4 Hardware and Firmware Features

Hardware Features

- 80186, 80MHz CPU, or compatible
- Philip SJA1000 CAN controller with 16M Hz clock
- Phillip 82C250 CAN Transceiver
- 1K VDC isolation on CAN side.
- Support both CAN specification 2.0A and 2.0B.
- Jumper select 120Ω terminator resistor for CAN channel
- 10/100 BASE-T DM9000AE compatible Ethernet Controller
- Support one RS-232 port, one RS-485 port and one CAN port
- Built-in self-tuner ASIC controller on RS-485 port
- 7-segment LED display.
- MS LED , NS LED , RUN LED

Firmware Features

- Programmable DeviceNet Master MAC ID.
- Programmable DeviceNet transfer-rate 125K, 250K, 500K.
- Supports maximum DeviceNet devices up to 63
- Predefined Master/Slave Connection Set
- The maximum Fragment number is (Input/Output) up to 64
- Supports I/O Operation Mode: Poll, Bit-Strobe and Change Of State/Cyclic
- Supports one Poll, one Bit-Strobe, one COS, one Cyclic IO connection for each DeviceNet device when connected with this module.
- Supports on-line adding device into and removing device from DeviceNet network.
- Supports boot-up auto communicate with slave devices.
- Converters single Mobbus/TCP to multi Modbus/RTU, set by Utility
- Supports VxComm technique for every COM ports of I-7243D, set by Utility
- Allowed multi-Modbus TCP clients access simultaneously

1.5 Specifications

RS-232 specification:

- RS-232 interface connector: TXD, RXD, CTS, RTS, GND;
- RS-232 Baud Rate: 110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps;

RS-485 specification:

- RS-485 interface connector: D2+, D2-;
- Self-turn ASIC inside;

Ethernet specification:

- 10/100 Base-T

CAN specification:

- CAN signal support: CAN_H, CAN_L;
- CAN bus interface: ISO 11898-2 ; 5 pin screw terminal connector.
- Isolation voltage: 1K VDC isolation on the CAN side;

Power requirement:

- Unregulated +10V DC ~ +30V DC;
- Power reverse protection, Over-Voltage brown-out protection;
- Power consumption: 3W;

Module specification:

- Dimensions: 123mm x 64.5mm x 19.6mm;
- Operating temperature: -25 to 75°C;
- Storage temperature: -40 to 80°C;
- Humidity: 5 to 95%, non-condensing;
- LEDs: Power led, MS, NS, RUN, 5-digits 7 segment led displays

Software Utility tool:

- Online adding/removing DeviceNet devices via Ethernet
- Online monitoring and configuring devices status via Ethernet.
- Get/Set Modbus/TCP input/output memory address
- Support DeviceNet I/O mapping table.
- Show DeviceNet devices connection status.
- Support communication modes setting.

Application:

- Factory Automation;
- Building Automation;
- Home Automation;
- Control system;
- Monitor system;
- Vehicle Automation;

1.6 Typical Applications

Although the I-7243D is designed as a Modbus/TCP server to DeviceNet master Gateway. But it can be used to link these RS-232/RS-485/DeviceNet devices to central computer as follows:

1.6.1 Modbus/TCP to multi-Modbus/RTU converter

I-7243D can be a single Modbus/TCP to multi-Modbus/RTU converter. You can simple use the I-7243D Utility software to configure the device and then set connection between SCADA, HMI software and the I-7243D. The block diagram of this application of I-7243D is given as follows:

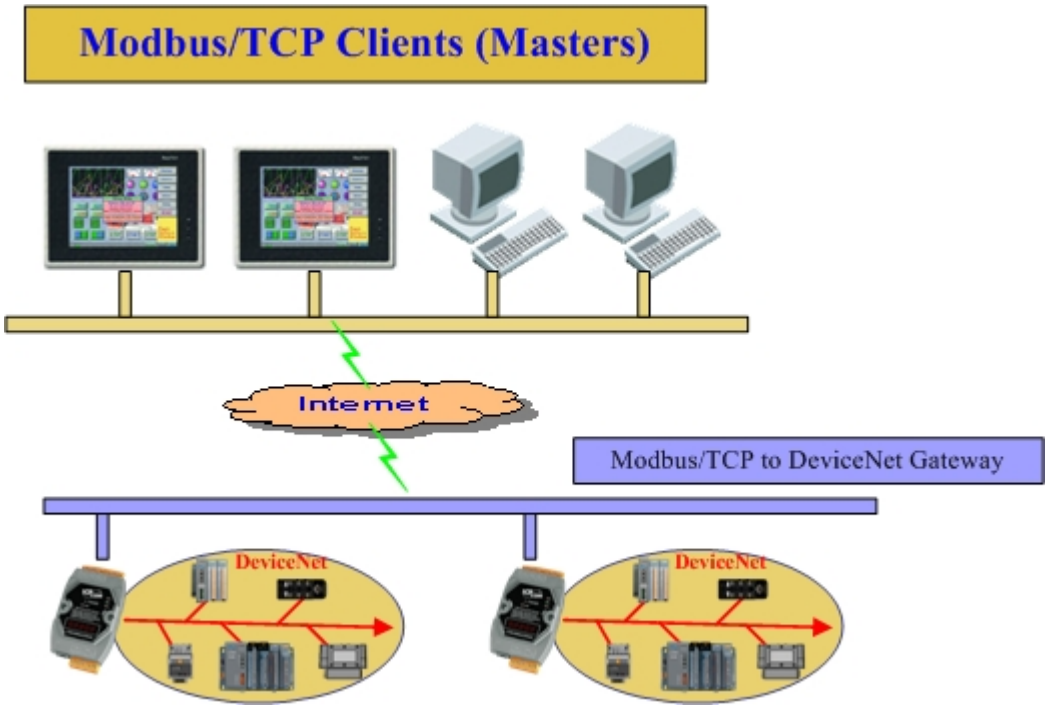


Figure 1-3: MBTCP to MBRTU application of I-7243D

1.6.2 Protocol converter with VxComm technology

An I-7243D can also be able to link to serial devices that don't support Modbus/RTU. To use this function, you will need to install VxComm driver on host PCs. After installation, you will be able to access the remote COM ports via the standard serial driver.

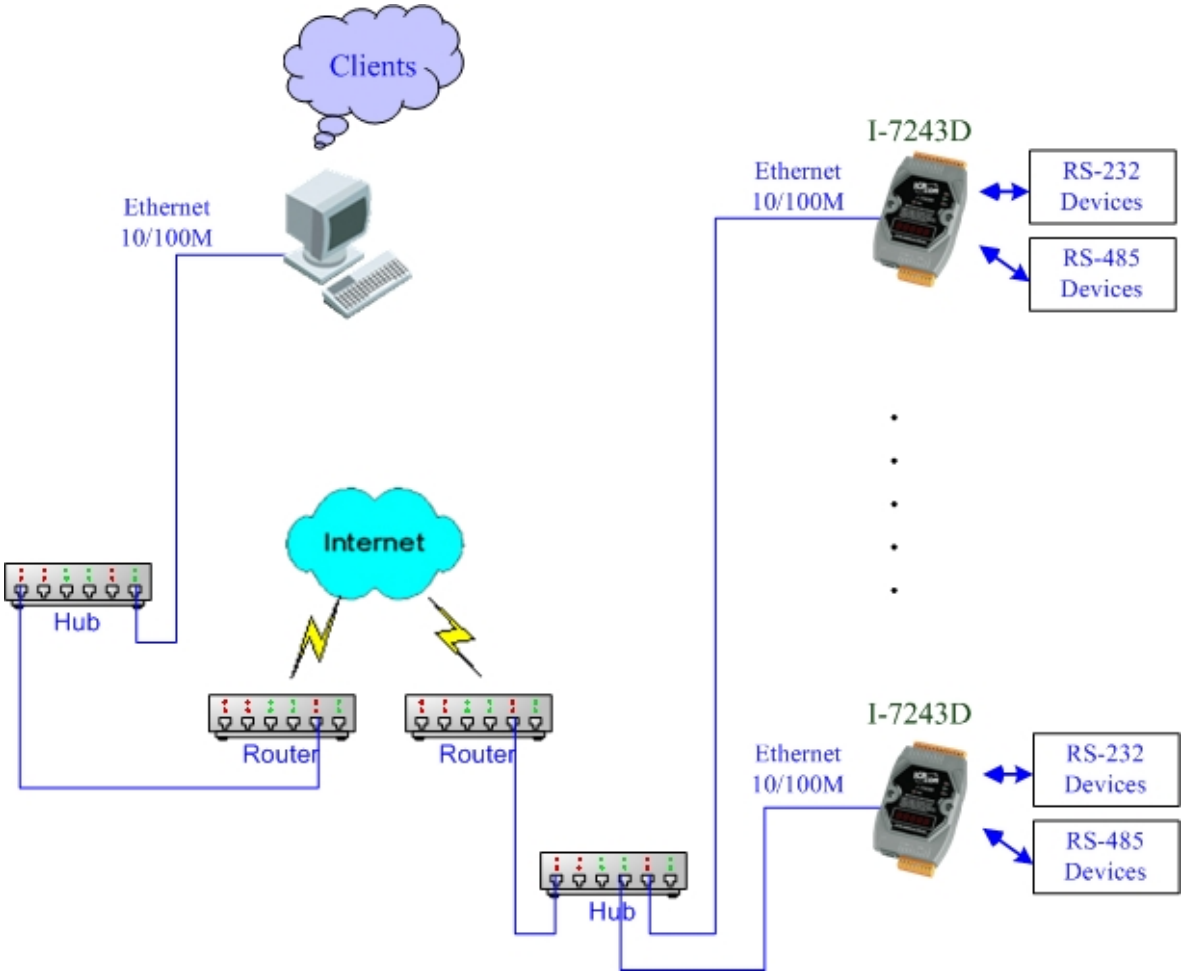


Figure 1-4: VxComm Application_1 of I-7243D

Compared to the RS-485 network, these Ethernet network hubs are already in existence for system network. Therefore, the RS-232 devices can find the closest hub and link to the central computer with the help of the I-7243D. The Ethernet network is extremely popular and already existing for most applications, hence, this approach is a very successful. In general, it is more difficult to write a TCP/IP program than a COM 1/2 program. **Therefore**, **the VxComm technology is developed to simulate COM-ports of the I-7243D to become COM 3/4/5…/256 of the central computer.** Then users can write a COM port program to link these RS-232/RS-485 devices and need not to concern themselves with any TCP/IP problem.

In some factories, there are old systems still running and in case. These old systems only support COM port applications. Therefore, the Vxcomm technology can be used to upgrade these old systems to support Ethernet network.

To recap, the VxComm technology is useful as follows:

- **Provides a much easier interface for software programmers.**
- **Keeps the old systems going without program modification**

The block diagram of VxComm technology for the I-7243D is given as follows:

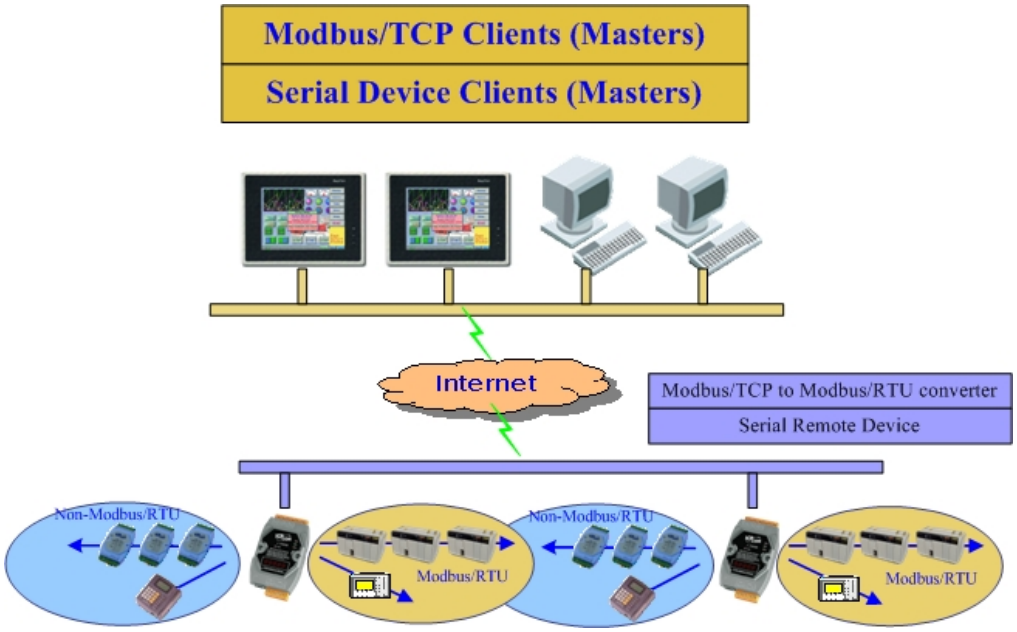


Figure 1-5: VxComm Application_2 of I-7243D

The VxComm technology can be used to simulate COM ports of the I-7243D to become a COM port of PC. With the help of VxComm driver, users can access the remote COM ports of the I-7243D just as them would access the PC's COM port.

1.6.3 Modbus/TCP to DeviceNet gateway

The I-7243D provides centralized data storage, “Internal Memory”, for data that is shared between the DeviceNet and Modbus/TCP network. Data is placed into the “Internal Memory” by one network interface, allowing the data to be read/wrote through the other network interface.

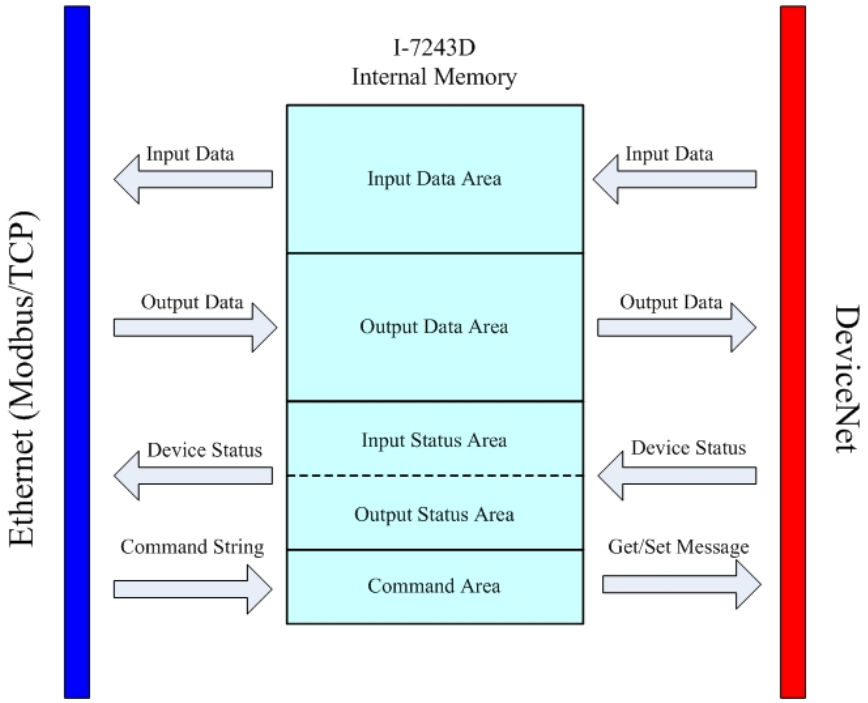


Figure 1-6: Internal Memory Table of I-7243D

ICP DAS DeviceNet Master Module (I-7243D) provides users to establish DeviceNet network rapidly by Master/Slave connection model. The DeviceNet Module acts as a Modbus/TCP server to DeviceNet master gateway. Using the module, users don't need to take care of the detail of the DeviceNet protocol. The module will implement the DeviceNet protocol automatically. It can reduce the complexity of user's DeviceNet Master Software. The module mainly supports the Predefined Master/Slave Connection Set functions to allow users to merge I/O data into DeviceNet network by using Modbus/TCP commands. It can help users to establish the connection with DeviceNet slave devices easily. The general application architecture is demonstrated as Figure 1.7.

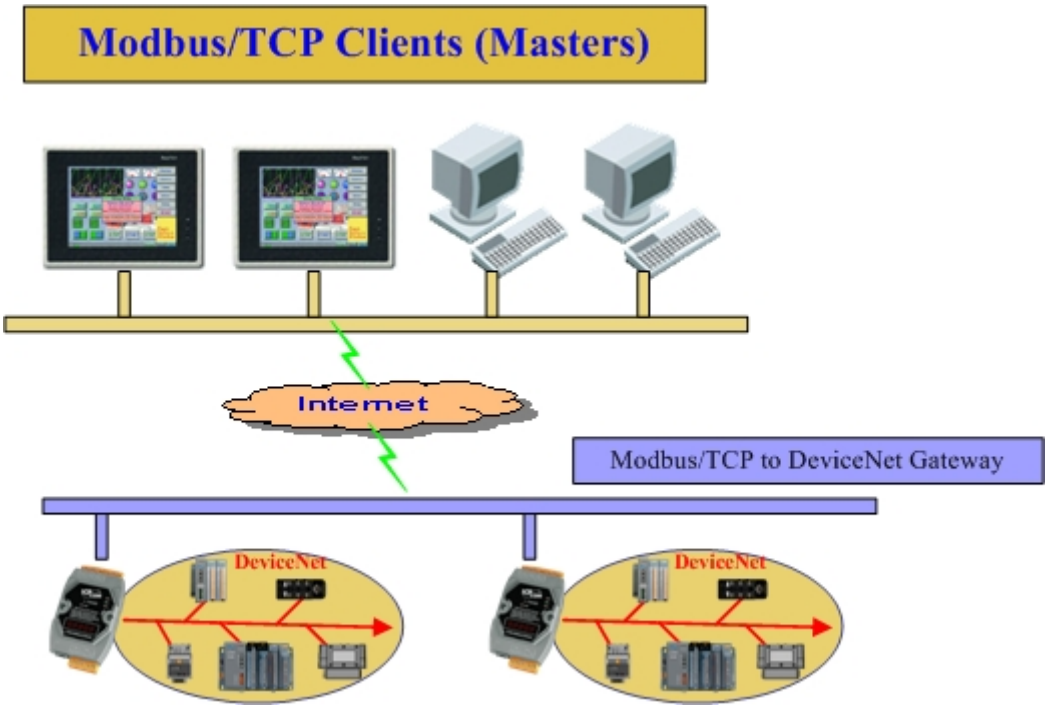


Figure 1-7: MBTCP to DeviceNet application of I-7243D

The module only provides the DeviceNet Master mechanism to communicate with slave devices by the Predefined Master/Slave Connection Set, which can be clarify as two forms: One is the Explicit Message and others are I/O Messages. Note that before communicating I/O data with DeviceNet slave devices, the Master device must connect to slave devices by explicit message connection to define the connection object. Here, we only provide one explicit message connection and four I/O connections as depicted in Figure 1.8.

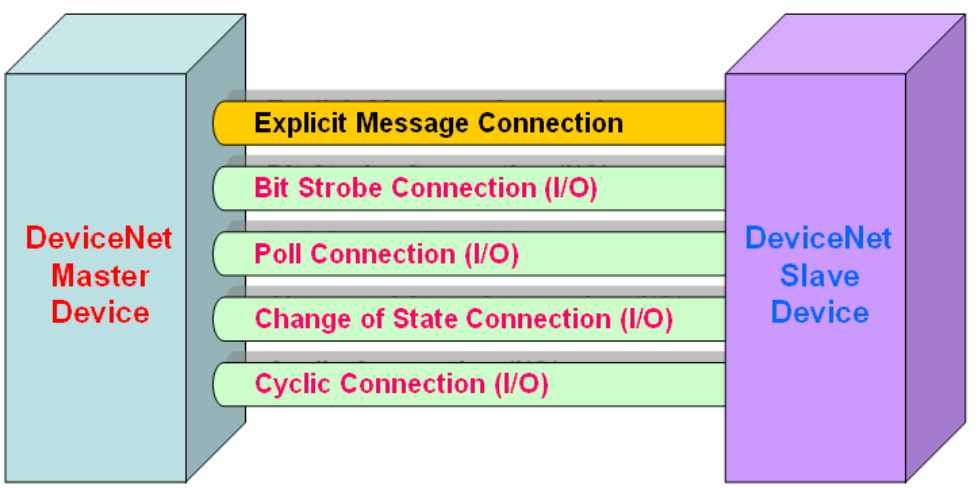


Figure 1-8: DeviceNet Messaging

The DeviceNet Communication Protocol is based on the concept of connections method. Master should create connections with slave devices based on the command of exchanging information and I/O data. To establish master control mechanism, there are only four main steps to be followed. Figure 1.9 demonstrates the basic process for the DeviceNet master communication. The every step function is described in below:

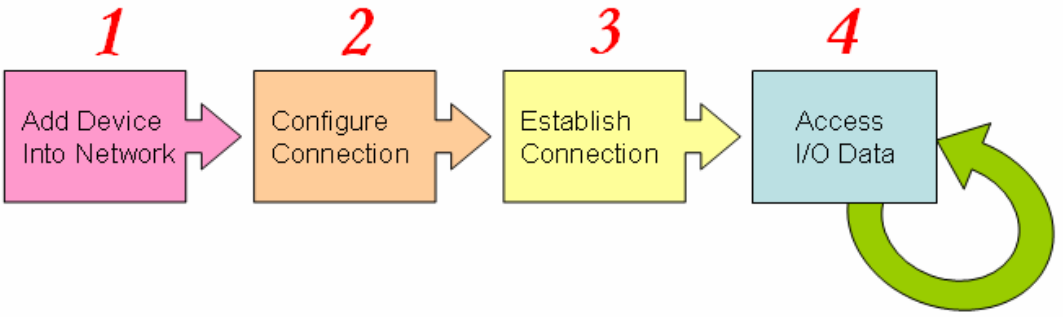


Figure 1-9: Four steps to establish connection

1. **Add device into network**
   You should provide the slave device's MAC ID to add into network.
2. **Configure connection**
   You can check the slave device's I/O connection type and the I/O data length. When configuring the I/O connection, you should provide these parameters.
3. **Establish connection**
   After configuring connections, users can start communicating with slave devices.
4. **Access I/O data**
   After communicating with slave devices, you can access the I/O data with corresponding read/write function.

After establishing the explicit connection, the connection path is then used to exchange the general information from one node to the others. And then users can create the I/O connections in the next step. Once I/O connections have been created, I/O data may be exchanged among devices in the DeviceNet network according to master device demand. Therefore, the master device can access I/O data of the slave devices by one of the four I/O connection methods. The module is not only easy to use but also providing a lot of the Modbus/TCP commands to retrieve and deliver the slave's I/O data. For more information, please refer to command description in section 6.

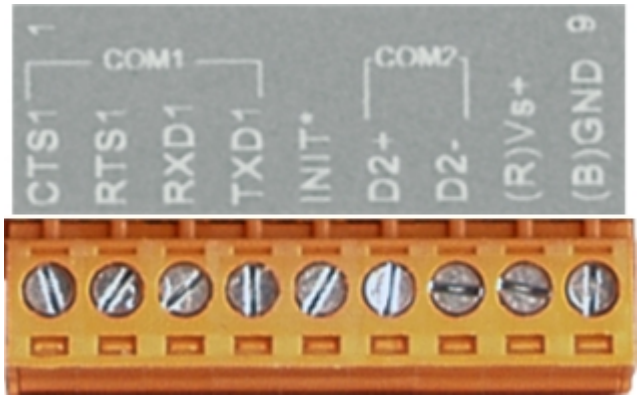
2. Hardware

2.1 Pin Assignment

Figure 2-1: Pin assignment on the I-7243D

2.1.1 RS-232 & RS-485 & Power supply interface

The I-7243D provides one RS-232 interface and one RS-485 interface with hardware flow control. The GND-signal of COM1 is shared with pin-9, GND. The pin assignment is shown in table 2-1.

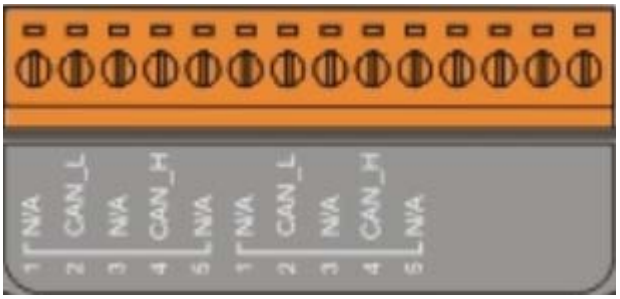


Pin	Name	Description
1	CTS1	CTS pin of COM1 (RS-232)
2	RTS1	RTS pin of COM1 (RS-232)
3	RXD1	RXD pin of COM1 (RS-232)
4	TXD1	TXD pin of COM1 (RS-232)
5	INIT*	Initial pin for enable/disable AUTOEXEC.BAT
6	D2+	Data+ pin of COM2 (RS-485)
7	D2-	Data- pin of COM2 (RS-485)
8	Vs+	V+ of power supply (+10V to +30V DC unregulated)
9	GND	GND of power supply

Table 2-1: COM Connector Pin Assignment

2.1.2 Connect to DeviceNet devices

In order to provide an easy CAN bus wiring, the I-7243D supplies one CAN port with two CAN bus connector interfaces. Each connecter built on the I-7243D looks like as figure 2-3 and table 2-2.



Pin No.	Signal	Description
1	N/A	Unavailable
2	CAN_L	CAN_L bus line (dominant low)
3	N/A	Unavailable
4	CAN_H	CAN_H bus line (dominant high)
5	N/A	Unavailable

Table 2-2: CAN bus Connector Pin Assignment

Note that the bypass CAN bus connector is not another CAN channel. It is designed for connecting to another CAN device conveniently. The structure of the inside electronic circuit is displayed as figure 2-2.

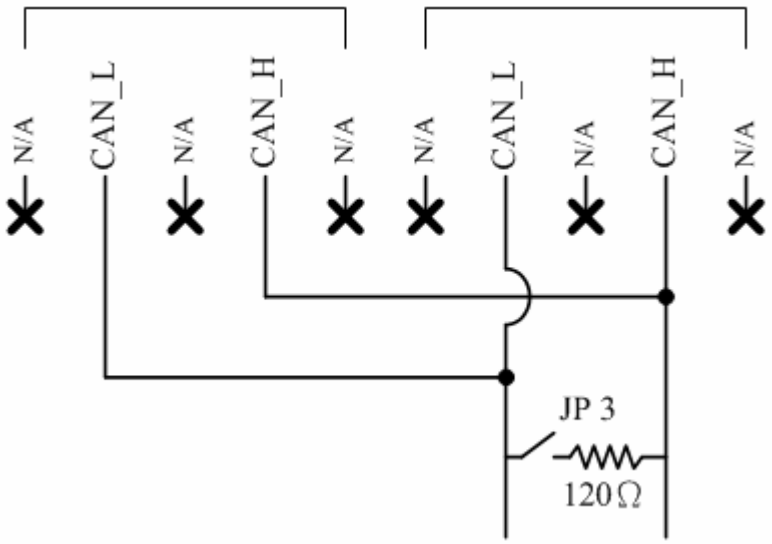
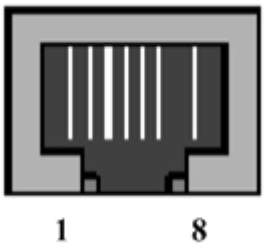


Figure 2-2 Electronic circuit of CAN bus connector

2.1.3 Ethernet connection

The Ethernet (10/100 Base-T) signals are routed to an RJ45 socket for easy connection using a standard CAT 3 or CAT 5 network cable. On power on of the I-7243D, it will auto-negotiate the network speed and connection.



Pin	Name	Description
1	TX+	Transmit Data +
2	TX-	Transmit Data -
3	RX+	Receive Data +
4	N.C.	Not Connected
5	N.C.	Not Connected
6	RX-	Receive Data -
7	N.C.	Not Connected
8	N.C.	Not Connected

Table 2-3: Ethernet Connector Pin Assignment

2.2 Terminator resistor settings

In order to minimize reflection effects on the CAN bus line, the CAN bus lines have to be terminated at both ends by two terminal resistances. Based on the ISO 11898-2 spec, each terminal resistance is 120Ω (or between 108Ω~132Ω). The length related resistance should have 70 mΩ/m. Users should check the resistances of their CAN bus, before they install a new CAN network as figure 2-3.

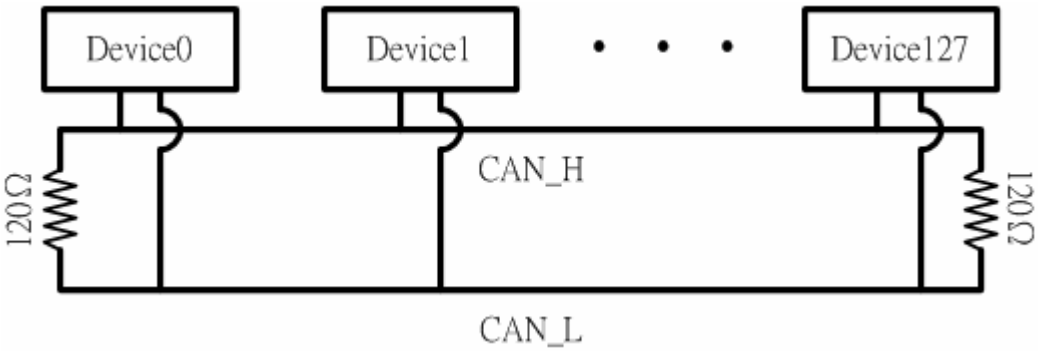


Figure 2-3: Terminator resistor

Moreover, to minimize the voltage drop on long distance, the terminal resistance should be higher than the value defined in the ISO 11898-2. Table 2-4 may be used as a reference.

Bus Length (meter)	**Bus Cable Parameters**		**Terminal Resistance (Ω)**
	Length Related Resistance (mΩ/m)	**Cross Section (Type)**	
0~40	70	0.25(23AWG)~ 0.34mm^2(22AWG)	124 (0.1%)
40~300	< 60	0.34(22AWG)~ 0.6mm^2(20AWG)	127 (0.1%)
300~600	< 40	0.5~0.6mm^2 (20AWG)	150~300
600~1K	< 20	0.75~0.8mm^2 (18AWG)	150~300

Table 2-4: Relation between bus cable and length

Therefore, the I-7243D module supplies a jumper for users to connect the terminator resistor or not. If users want to use this terminator resistor, please open the I-7243D cover and use the JP3 jumper to activate the 120Ω terminator resistor built in the system, as in the figure 2-4. Note that the default setting is active. And about the J3 jumper setting, please refer the table 2-5.

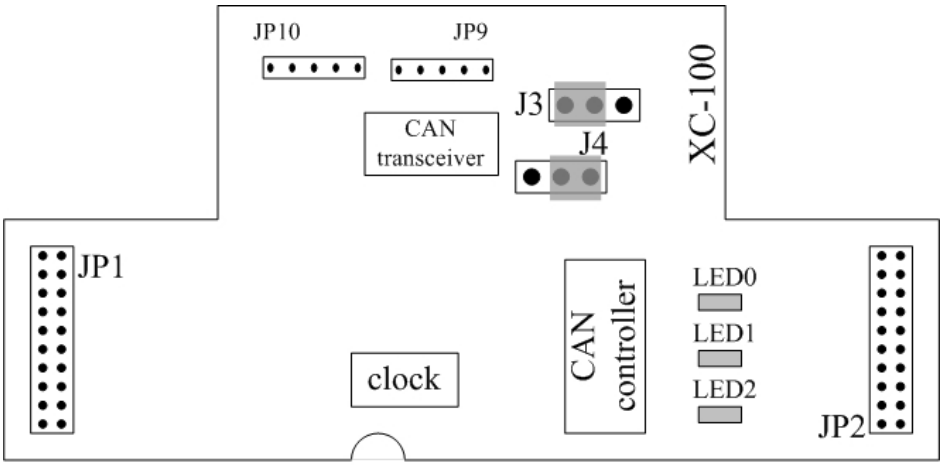


Figure 2-4 XC100 I/O expansion board LAYOUT

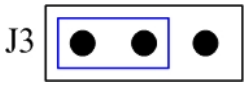
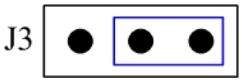
Apply the termination resistor(120Ω)	**Don't apply the termination resistor**
	

Table 2-5 J3 Jumper Selection

2.3 LED Indication

The I-7243D acts as a Modbus/TCP to DeviceNet gateway. It provides some LEDs to indicate what situation the I-7243D is in.

2.3.1 Power LED

There is a red indicator-LED in the I-7243D as follow:

- ✧ Firmware is running: **flashing red**

The default shipping of I-7243D will be firmware inside, so the red indicator-LED of I-7243D will be flashing two times per second periodically.

2.3.2 Module Status indicator LED

The I-7243D includes three single-color LED displays to indicate the status of module, network and I/O device. They are MS LED (it is red), NS LED (it is green), and RUN LED (it is red). The Indicators assist maintenance personnel in quickly identifying a problem unit. When the I-7243D events occur, these indicators will be triggered to glitter with different conditions.

- MS LED

This led provides module status and indicates whether or not the module is operating properly. Table 2-6 shows the conditions of MS status. Therefore, when the I-7243D is operated normally, the MS led must be turned off.

Condition	**Description**
Off	Module is normal; no error occurs
Red	Module has unrecoverable fault
Flashing red	Module has recoverable fault. To recover: Reset device or perform error recovery

Table 2-6 MS led conditions

- NS LED

This led indicates the DeviceNet communication status of the module. Table 2-7 shows the conditions of NS status. When module is online and start to communicate with the devices, it will be solid green. If there are some devices disconnected with the I-7243D, the NS led will be flashing.

Condition	**Description**
off	Module stops to communicate with all devices
Flashing green	There exists at least one device disconnect with the module
Solid green	Module is online and start to communicate with all devices

Table 2-7 NS led conditions

- RUN LED

This led indicates the configuration status of the I-7243D. Table 2-8 shows the conditions for RUN status. If there is no configuration, the RUN led will be flashing. After configuring the DeviceNet devices by I-7243D Utility tool, the I-7243D will start to communicate with them and the RUN led will becomes solid red.

Condition	**Description**
Off	Some errors occur on the module
Flashing red	Module is waiting for configuring
Solid red	Module has been configured O.K.

Table 2-8 RUN led conditions

2.3.3 5-digits 7-Segment LED Displays

The 5-digits 7-SEG LED will show as figure 2-5.

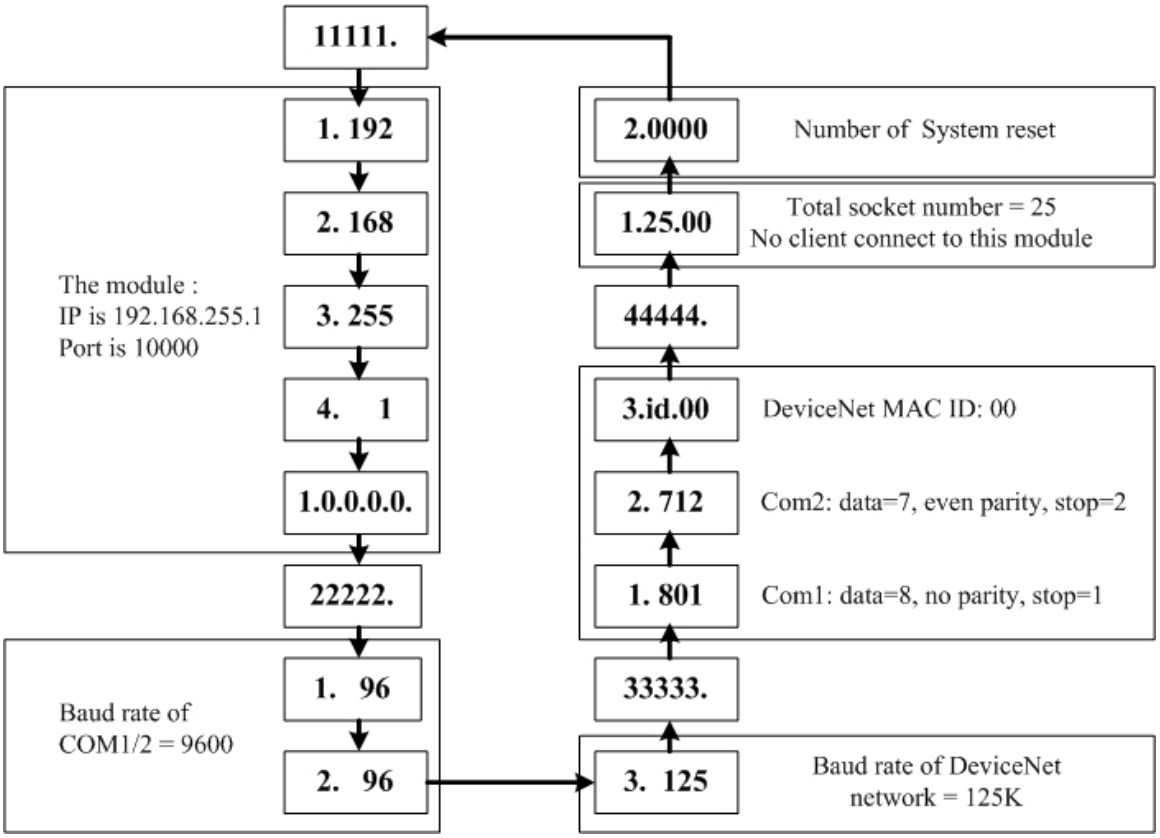


Figure 2-5 7-SEG LED Displays

The important information of I-7243D can be divided as follows:

- Group-ID 11111: IP information of this I-7243D
- Group-ID 22222: baud rate of all ports
- Group-ID 33333: configuration of all ports
- Group-ID 44444: client-connected information and system reset state of this I-7243D

The IP information format of I-7243D is given as follows:

- Group-ID of 5-digit LED: 11111.
- LED-1: indicator, can be 1 or 2 or 3 or 4
- LED-2~5: IP

The LED will show Group-ID first, and then show its IP as the above diagram indicates. If users change IP, the value shown will change immediately. The default

shipping IP = 192.168.255.1 ➔ the LED-show sequence is given as above diagram.

The baud-rate format of COM ports are given as follows:

- Group-ID of 5-digit LED: 22222.
- LED-1: COM port number
- LED-2~5: value of (baud/100)

The baud-rate format of CAN port is given as follows:

- LED-1: indicator, 3, CAN port.
- LED-2~5: value of (baud/1000)

The COM port are shown in LED-1 and their baud rate is shown in the LED-2~5. The COM port baud rate = (value of LED-2~5)*100. Therefore, shown-value=1. 96 means baud rate of COM1=9600BPS; shown-value= 2.1152 means baud rate of COM2= 115200 BPS. It's the same as the CAN port baud rate. The CAN port baud rate = (value of LED-2~5)*1000. Therefore, shown-value=3. 125 means baud rate of DeviceNet network =125KBPS; shown-value= 3.500 means baud rate of DeviceNet network= 500KBPS. All baud rate of I-7243D's port will be shown one by one.

The configuration of COM ports are given as follows:

- Group-ID of 5-digit LED: 33333.
- LED-1: COM port number
- LED-3: data bit, 7 or 8
- LED-4: parity bit, 0=no parity, 1=even parity, 2=odd parity
- LED-5: stop bit, 1 or 2

The configuration of CAN port is given as follows:

- LED-2/3: fix string, "id.".
- LED-4/5: DeviceNet MAC ID of this module, default 00.

The connection-client information is given as follows:

- Group-ID of 5-digit LED: 44444.
- LED-2/3: numbers of free sockets are available, default 25.
- LED-4/5: numbers of sockets are used by clients, default 0.

The reset state of system is given as follows:

- LED-2~5: reset number, display in decimal mode.

When the I-7243D is powered-off or just been reset, the reset number will be increased. If any one client connects to this I-7243D, the free-sockets will be decreased and used-sockets will be increased. If the free-sockets number is reduced to 0, then no extra client can link to this I-7243D. The default number of free-sockets is 25. Therefore, the I-7243D allows 25 clients link to it.

3. DeviceNet Interface

3.1 Network Communication

The I-7243D, Modbus/TCP to DeviceNet Gateway, acts as a DeviceNet master on DeviceNet network. It can exchange I/O data with up to 63 nodes. Users can use the I-7243D Utility tool to access the module over Ethernet network via Modbus/TCP commands.

3.2 Slave Device Communication

After the configuration of slave devices, the I-7243D will start to establish connections with device in the scan list (list of configured slaves). Once connections are established, the module will perform all necessary steps to configure the required I/O messaging.

The I-7243D provides explicit message proxy services for all “Group 2 Only Server” devices. Once any Group 2 Only devices are configured, the I-7243D will send message to the devices, explicit message connection value for watchdog_timeout_action to “Deferred Delete”, in addition to the I/O messages. This function prevents the explicit message connections between the I-7243D and the slave from timing out when communicating with I/O messages.

The I-7243D supports four I/O messaging types specified by the DeviceNet protocol. These include polling, bit-strobe, COS, Cyclic I/O messages. I/O messaging and I/O parameters are configured by using the I-7243D Utility tool.

3.3 Scan Cycles

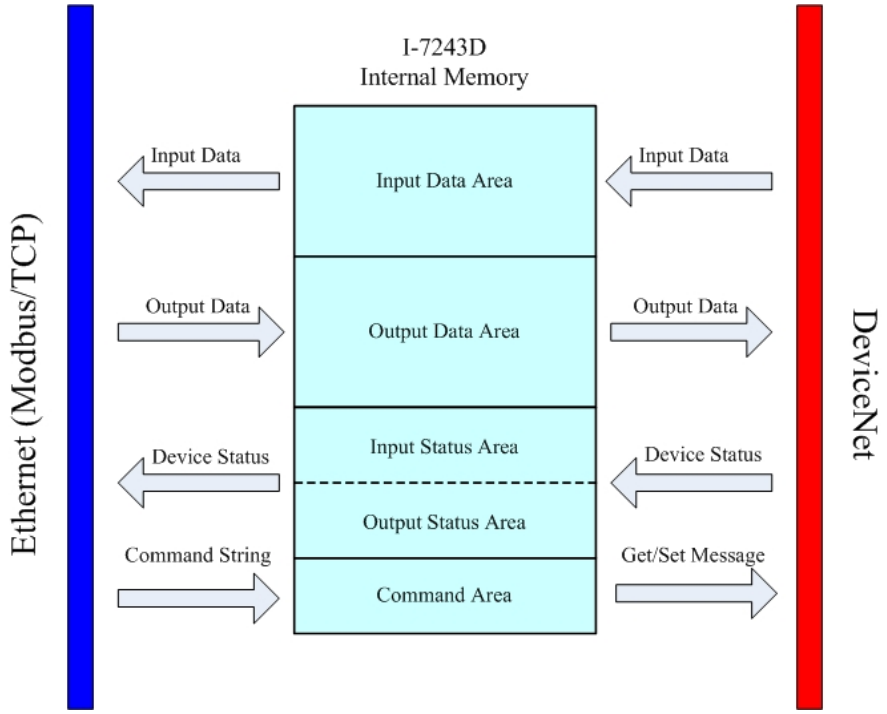
The I-7243D employs a scan cycle for producing I/O messages. A scan cyclic consists of the following:

- Polling messages to every device configured as polled I/O
- Bit-Strobe output messages to devices configured as bit-strobe.

If the internal timer exceeds the explicit packet rate of certain I/O connections, the I/O message will be sent to the slave devices.

3.4 Interaction with Internal Memory

The DeviceNet interface in the I-7243D accesses the I/O data areas from slave I/O connections processed by the DeviceNet master; there is no synchronization between the Ethernet and DeviceNet network interfaces. As shown in the following picture.



When an I/O connection with a slave requires that output data be sent to the slave, it will be read from the Output Data Area. The data read is what was placed there by the last write to the Output Data Area by using Modbus/TCP commands.

When input data is received from DeviceNet I/O connection, it is copied to the Input Data Area. This data is available to be read by the Modbus/TCP commands on the next data exchange.

All the connection status and configuration are stored in the Status Area of I-7243D's Internal Memory. And these data are available to be read by the Modbus/TCP commands at any time.

The Command Area is used for saving Modbus/TCP commands that contain specific data formats packed in the "Force Multiple Registers" command, function code: 16. After receiving this specific data format command, the I-7243D will unscramble it and perform the relative procedure.

4. Modbus/TCP Interface

The I-7243D supports Modbus/TCP commands. The implementation of the Modbus/TCP server is done according to the Modbus/TCP specification 1.0. All commands according to class 0, class 1 and partially class 2 slave functionality are implemented.

The module can handle maximum 25 simultaneous Modbus TCP connections.

4.1 Commands

The following Modbus/TCP commands are supported by the I-7243D.

Function Code	Function Name	Class	Affects	Address Method
1	Read Coils	1	IN/OUT	Bit
2	Read Input Discrete	1	IN/OUT	Bit
3	Read Multiple Registers	0	IN/OUT	Word
4	Read Input Registers	1	IN/OUT	Word
5	Write Coil	1	OUT	Bit
6	Write Single Register	1	OUT	Word
15	Force Multiple Coils	2	OUT	Bit
16	Force Multiple Registers	0	OUT	Word

Table 4-1: Modbus Commands

4.2 Exception Codes

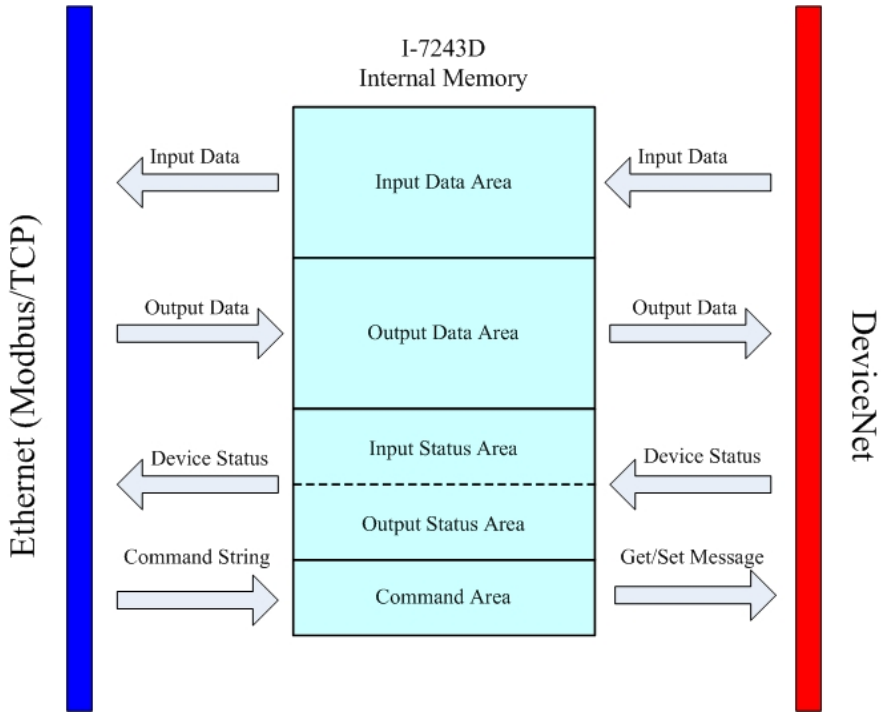
An exception code is returned in the response when the I-7243D is unable to service the Modbus request that was received. The following exception codes will be used by the I-7243D.

Exception Code	Name	Description
01	Illegal Function	The module does not support the function code in the query
02	Illegal Data address	The data received in the query is outside the initialized memory area
03	Illegal Data Value	The data in the request is illegal

Table 4-2: Exception Codes

4.3 Modbus/TCP Addressing

The I-7243D supports an “Internal Memory” for saving I/O data. The input and output data areas are set to a maximum size of 256 words each. The command area is 255 words. The input status area is 4642 words and the output status area is 322 words. When accessing these areas, by Modbus commands, the address is according to the following tables.



4.3.1 Input/Output Data Areas

The I/O Data Area are used for users to access devices I/O data directly. After using Utility tool to set the memory mapping of the I/O devices, users can get/set the I/O data according to the mapping address of each I/O data.

Users can use Modubs FC4 command, read input registers, to get the input data values from I-7243D's input data area.

Word Address (3xxxx)
0000h
0001h
0002h
:
00FFh

Table 4-3: Input Addressing

Users can use Modbus FC16 command, force multiple registers, to set the output data values into I-7243D's output data area.

Word Address (4xxxx)
0000h
0001h
0002h
:
00FFh

Table 4-4: Output Addressing

I/O Data Format

The I-7243D transfers I/O data between Modbus/TCP and DeviceNet without regard to data content or format. Due to this, the user is responsible for making sure that the devices on either network understand the format of the data.

DeviceNet is a little-endian protocol; values ate transmitted least significant byte first. Therefore, all data in the I/O Data Areas is assumed, by DeviceNet nodes, to be stored as little-endian.

Users should to make sure the Modbus/TCP master handles input data and transmits output data in a format acceptable to the target DeviceNet devices (least significant byte first). The user must know where in the I/O Data Areas DeviceNet data has been mapped.

4.3.2 Command Area

The Command Area is used for saving Modbus/TCP commands that contain specific data formats packed in the “Force Multiple Registers” command, function code: 16. After receiving this specific data format command, the I-7243D will unscramble it and perform the relative procedure.

Users can use Modubs FC16 command, force multiple registers, to send specific data format into I-7243D’s command area. These specific data format types, can be accepted by I-7243D, are listed and described in the section 6.

Word Address (4xxxx)
0100h
0101h
0102h
:
01FFh

Table 4-5: Command Addressing

4.3.3 Output Status Area

The Output Status Area is used for saving information for DeviceNet output devices. Users can use Modubs FC3 command, read multiple registers, to read the data from I-7243D's Output Status Area.

Word Address (4xxxx)	Description
02FFh	Total number of output commands
0300h	Specific data format string for output command
0301h	
:	
061Fh	

Table 4-6: Output Status Addressing

Word Address 02FFh: Total number of output commands.

If users use Utility tool to set the Internal Output Memory of output device, the value of this parameter will be changed.

Word Address 0300h ~ 061Fh: Specific data format string.

For saving specific data format string that are sent by Utility tool to configure output device data address. The types of the specific data format are described in following table. Each specific data format contains 4 words. And the maximum number of the command string is 100.

Word Address (4xxxx)	Description	Data Length	Data
0300h	Device 1, Start address of Output Data Area	2 Bytes	0x0000~0x01FF
0301h	Device 1, Output data length	2 Bytes	0x0000~0x0200
0302h(High)	Device 1, MACID	1 Byte	0x00~0x3F
0302h(Low)	Device 1, Connection Type	1 Byte	0x00: Explicit 0x01: Poll 0x02: Bit-Strobe 0x03: COS 0x04: Cyclic
0303h(High)	Device 1, Data Type	1 Byte	0x01: Output command
0303h(Low)	End Char = CR (0x0D)	1 Byte	0x0D
0304h~0307h	Device 2 data format	4 Words	
:	:	:	
061Ch~061Fh	Device N data format	4 Words	

4.3.4 Input Status Area

The Input Status Area is used for saving information for each DeviceNet input device. Users can use Modubs FC4 command, read input registers, to read the data from I-7243D's Input Status Area.

Word Address (3xxxx)	Description
02FFh	Total number of input commands
0300h	Specific data format string for input command
0301h	
:	
061Fh	
0620h	Reserved
:	
06EFh	
06F0h	MAC ID & Baud-rate
06F1h	Firmware version
06F2h	Module status
06F3h	Reserved
:	
06FFh	
0700h	Scan-list table for each device
:	
14BFh	
14C0h	Reserved
:	
14FFh	
1500h	Allocate choice byte of each device
:	
151Fh	

Table 4-7: Input Status Addressing

Word Address 02FFh: Total number of input commands.

If users use Utility tool to set the Internal Input Memory of input device, the value of this parameter will be increased or decreased.

Word Address 0300h ~ 0620h: Specific data format string.

For saving specific data format string that are sent by Utility tool to configure input device data address. The type of the specific data format is described in the following table. Each specific data format contains 4 words. And the maximum number of the command string is 100.

Word Address (3xxxx)	Description	Data Length	Data
0300h	Device 1, Start address of Input Data Area	2 Bytes	0x0000~0x01FF
0301h	Device 1, Input data length	2 Bytes	0x0000~0x0200
0302h(High)	Device 1, MACID	1 Byte	0x00~0x3F
0302h(Low)	Device 1, Connection Type	1 Byte	0x00: Explicit 0x01: Poll 0x02: Bit-Strobe 0x03: COS 0x04: Cyclic
0303h(High)	Device 1, Data Type	1 Byte	0x00: Input command
0303h(Low)	End Char = CR (0x0D)	1 Byte	0x0D
0304h~0307h	Device 2 data format	4 Words	
:	:	:	
061Ch~061Fh	Device N data format	4 Words	

Word Address 06F0h: DeviceNet MACID and baud-rate of I-7243D

High byte of word address 06F0h: DeviceNet MACID setting of I-7243D

Low byte of word address 06F0h: DeviceNet baud-rate setting of I-7243D

Word Address 06F1h: The firmware version of I-7243D

Word Address 06F2h: The status of I-7243D

The value of this word address can be 0(No Error), 1005(CAN Board Active Error), 1600(Module Online Error), 2600(CAN Bus Error) decimal.

Word Address 0700h ~ 14C0h: Scan-list table for each device

The I-7243D supports 5 DeviceNet connection type, Explicit, Polling, Bit-Strobe, COS, Cyclic connection, for each DeviceNet device. For each connection of every device, there exist 14 parameters, 22 bytes, for users to understand what the status the connection is. If there makes no connection with this connection, the values of these parameters will be 0xFFh. The parameters of the scan-list are listed in the below table.

Word Numbers	Byte Numbers	Description
1	1	Destination MACID
	1	Connection Type
2	2	Input Data Length
3	2	Output Data Length
4	4	Start Time
5		
6	1	Start Device Or Not
	1	Connection Status
7	1	Command
	1	Result
8	2	Explicit Packet Rate
9	1	Data In Status
	1	Data Out Status
10	2	Data In Index
11	2	Data Out Index

Table 4-8: Parameters of Scan-list table

And the relative location of these parameters and connection are listed in the following table.

Word Address (3xxxx)	Description
0700h ~ 070Ah (11 words)	Device MACID: **00** **Explicit Connection** Parameters of Scan-list
070Bh ~ 0715h (11 words)	Device MACID: **00** **Poll Connection** Parameters of Scan-list
0716h ~ 0720h (11 words)	Device MACID: **00** **Bit-Strobe Connection** Parameters of Scan-list
0721h ~ 072Bh	Device MACID: **00**

(11 words)	**COS Connection** Parameters of Scan-list
072Ch ~ 0736h (11 words)	Device MACID: **00** **Cyclic Connection** Parameters of Scan-list
0737h ~ 0741h (11 words)	Device MACID: **01** **Explicit Connection** Parameters of Scan-list
0742h ~ 074Ch (11 words)	Device MACID: **01** **Poll Connection** Parameters of Scan-list
074Dh ~ 0757h (11 words)	Device MACID: **01** **Bit-Strobe Connection** Parameters of Scan-list
0758h ~ 0762h (11 words)	Device MACID: **01** **COS Connection** Parameters of Scan-list
0763h ~ 076Dh (11 words)	Device MACID: **01** **Cyclic Connection** Parameters of Scan-list
076Eh ~ 07A4h (55 words)	Device MACID: **02** Parameters of Scan-list
07A5h ~ 07DBh (55 words)	Device MACID: **03** Parameters of Scan-list
07DCh ~ 07DBh (55 words)	Device MACID: **04** Parameters of Scan-list
0813h ~ 0849h (55 words)	Device MACID: **05** Parameters of Scan-list
: :	: :
141Bh ~ 1451h (55 words)	Device MACID: **61** Parameters of Scan-list
1452h ~ 1488h (55 words)	Device MACID: **62** Parameters of Scan-list
1489h ~ 14BFh (55 words)	Device MACID: **63** Parameters of Scan-list

Table 4-9: Scan List Table for each device

Destination MACID: The destination device MACID of this connection, 0~63.

Connection Type: The connection type of this connection.

Connection Type	values(decimal)
Explicit Connection	0
Poll Connection	1
Bit-Strobe Connection	2
COS Connection	3
Cyclic Connection	4

Input Data Length: The input data length of the device that this connection communicating with, displaying in decimal mode.

Output Data Length: The output data length of the device that this connection communicating with, displaying in decimal mode.

Start Time: The start time of the module send a request message to the device by this connection.

Start Device Or Not: Flag for recording whether the module is start to communicate with the device by this connection.

Start Device	values(decimal)
Start_Device_No	0
Start_Device_Yes	1

Connection Status: Connection status of this connection. Please refer to appendix A, connection status table, for more description.

Command: The message type of this connection is used to communicate with the device. Please refer to appendix B, command table, for more description.

Result: The result of this connection is in. Please refer to appendix C, result table, for more description.

Explicit Packet Rate: Explicit Packet Rate of this connection.

Data In Status: The status of input data buffer.

Status values(decimal)	Description
0	No buffer
1	Initial OK
2	Getting Data
3	Get Data OK
4	Get Data Error
5	Get Data Timeout
10	Get Attribute Error
11	Get Attribute Timeout

Data Out Status: The status of output data buffer.

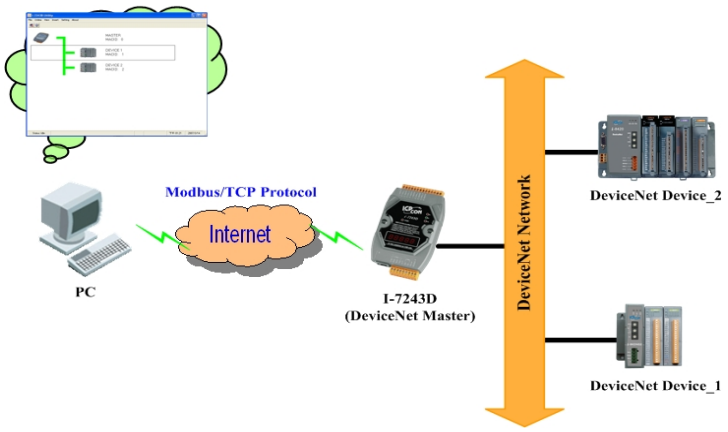
Status values(decimal)	Description
0	No buffer
1	Initial OK
2	Setting Data
3	Set Data OK

Data In Index: Used for firmware to check what's the data in index of this connection.

Data Out Index: Used for firmware to check what's the data out index of this connection.

5. Configuration

5.1 I-7243D Configuration Tool (I-7243D Utility)



The I-7243D Utility tool can be used to configure the operation condition of the I-7243D module. Also it can be used to monitor/configure, add/remove the devices on the DeviceNet network. To start the “I-7243D Utility”, please install the I-7243D Utility setup file and run the I-7243D.exe file. The screenshot of the startup screen for this Utility is given in the below figure. Connect the I-7243D’s Ethernet port with the PC’s Ethernet port via a standard CAT 3 or CAT 5 network cable. It will auto-negotiate the network speed and connection. Then the user can online monitor and configure the connection status of the I-7243D. For further information related to this, please refer to section 2 of this manual on how to make a hardware connection.

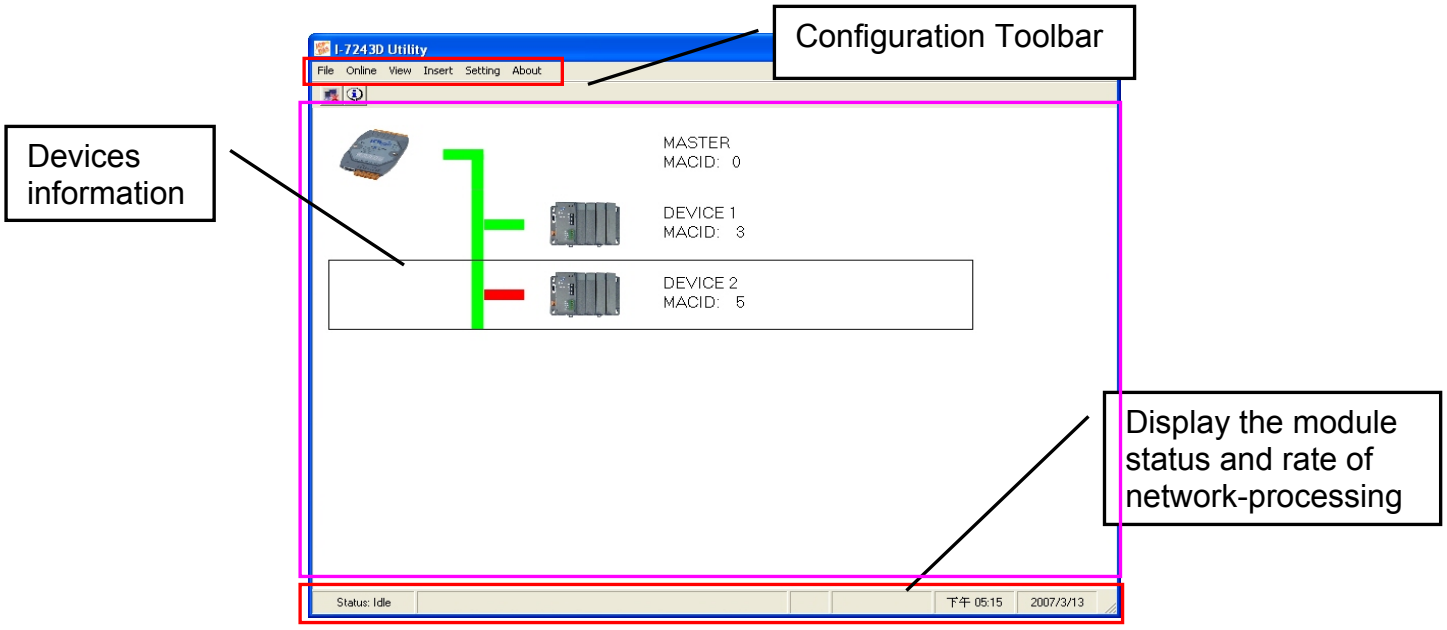


Figure 5-1: I-7243D Utility

5.1.1 Install & uninstall the I-7243D Utility

Install I-7243D Utility

Step1: Download the I-7243D Utility setup file from the web site http://www.icpdas.com/products/Remote_IO/can_bus/i-7243d.htm or the CD-ROM disk following the path of "CAN-CD:\\DeviceNet\Gateway \I-7243D\Utility

Step 2: Execute the setup.exe file to install I-7243D Utility.

Step 3: A "Welcome" window pops up to prompt user to begin the installation. See figure 5-2.

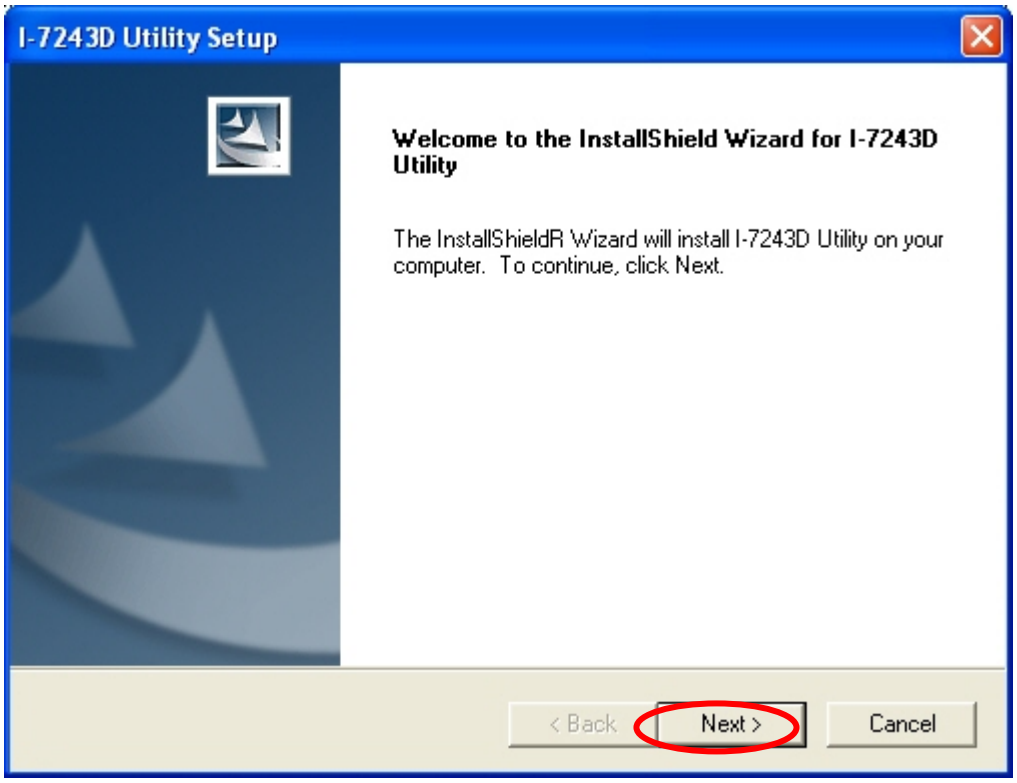

I-7243D Utility Setup
Welcome to the InstallShield Wizard for I-7243D Utility
The InstallShieldR Wizard will install I-7243D Utility on your computer. To continue, click Next.
< Back
Next >
Cancel

Figure 5-2: Welcome dialog

Step 4: Click the “Next” button and A “Choose Destination Location” window will pop up for deciding the installation path.

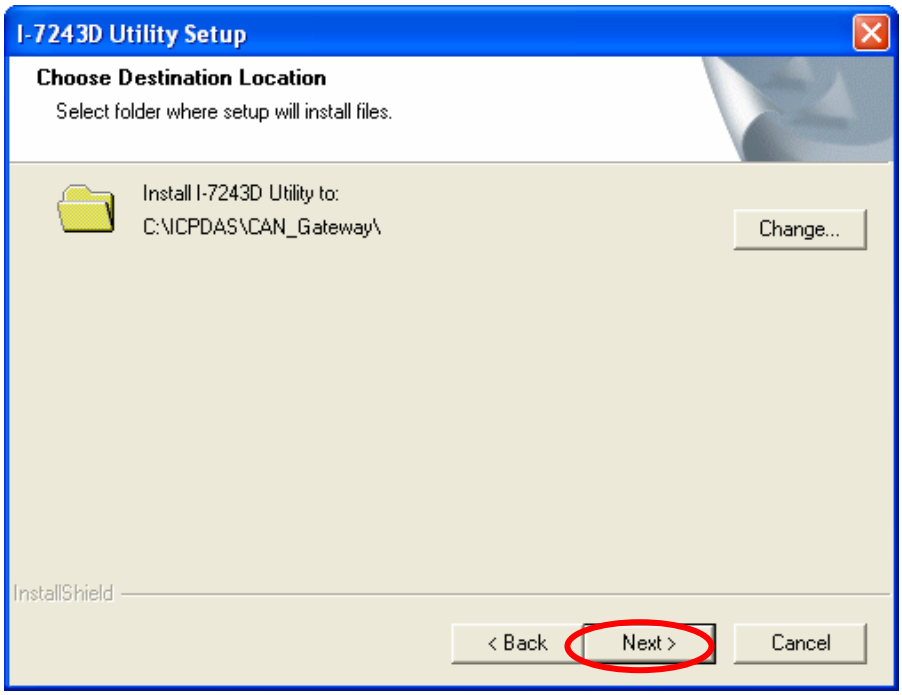


Figure 5-3: “Choose Destination Location” dialog

Step 5: Click “Next” button and a “Ready to Install the Program” window will pop up to prompt user that the wizard is ready to begin the installation See figure 5-4.

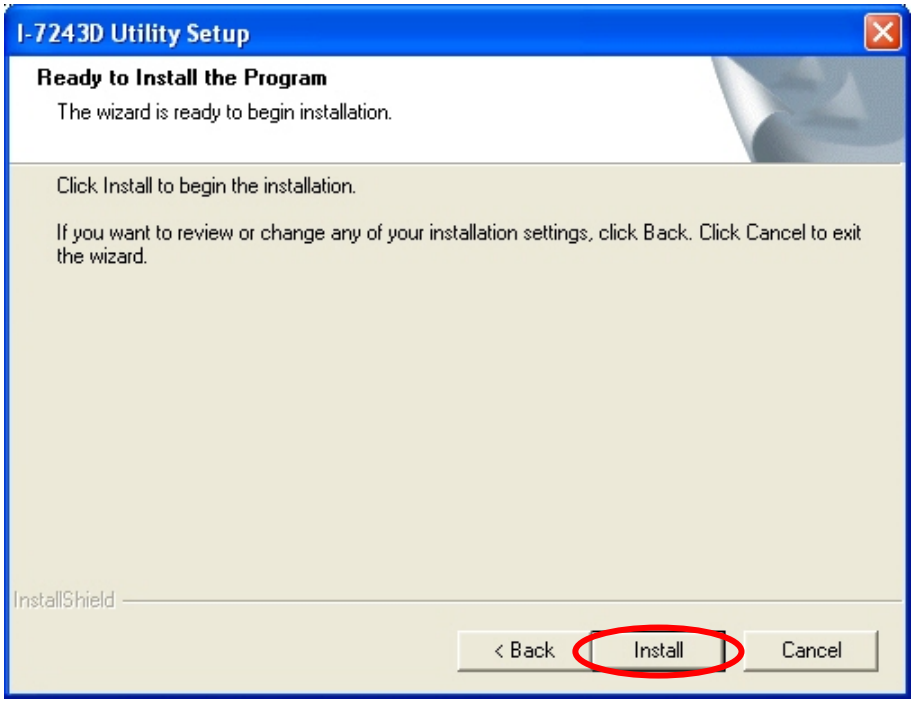

I-7243D Utility Setup
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Figure 5-4: “Ready to Install the Program” dialog

Step 6: Click “Install” button and start to install the I-7243D Utility to the system. After finishing the process, a “Complete” window will pop up to prompt users that the successful completion of the installation. And click “Finish” button to exit. See figure 5-5.

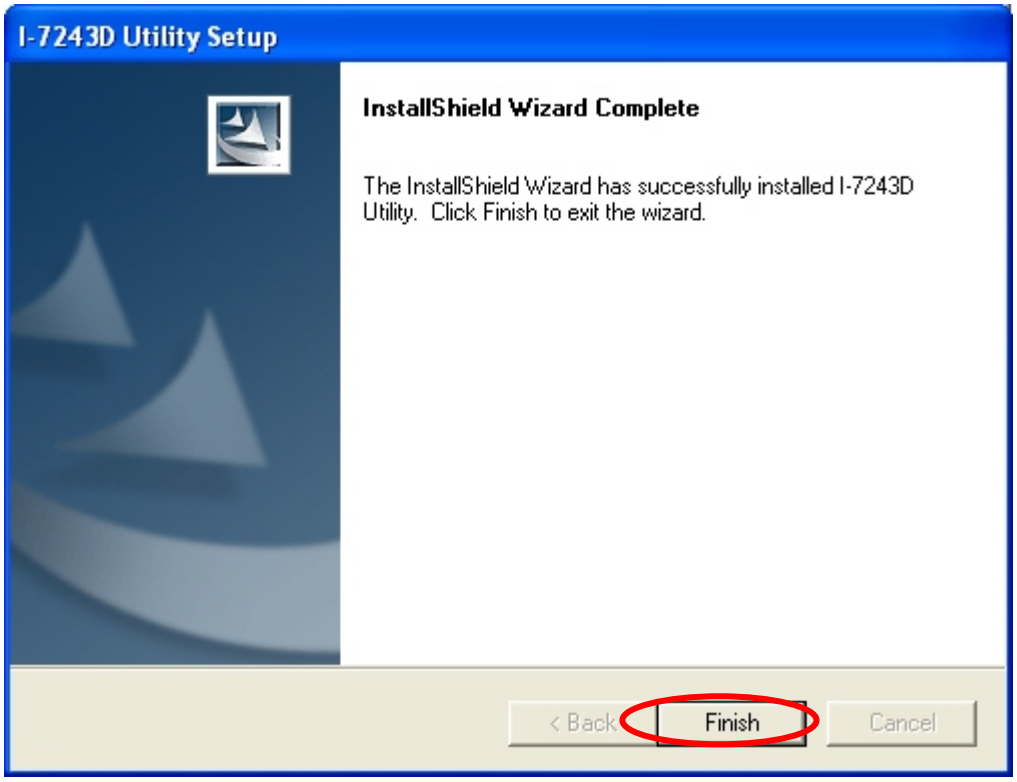

I-7243D Utility Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed I-7243D Utility. Click Finish to exit the wizard.
< Back
Finish
Cancel

Figure 5-5: “Successful Completion of the Installation” dialog

Step 7: After finishing the installation of the I-7243D Utility, users can find it as shown in figure 5-6.

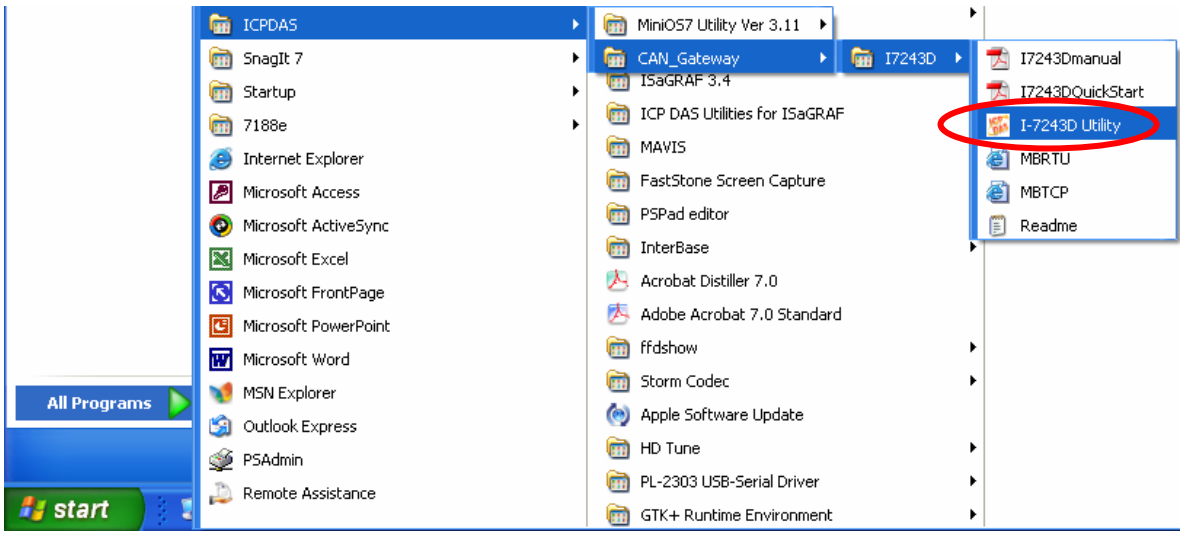


Figure 5-6: You can find “I-7243D Utility“ at the “Start” in the task bar

Uninstall I-7243D Utility

You can uninstall I-7243D Utility software by the following means described below:

Step 1: Click “Start” in the task bar, then click the Control Panel as shown in figure 5-7.

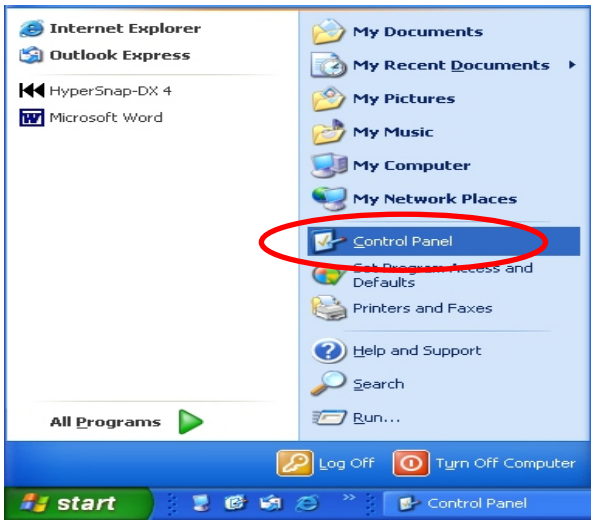


Figure 5-7: Select settings

Step 2: Double click the “Add or Remove Programs” button icon to open the dialog. See figure 5-8.

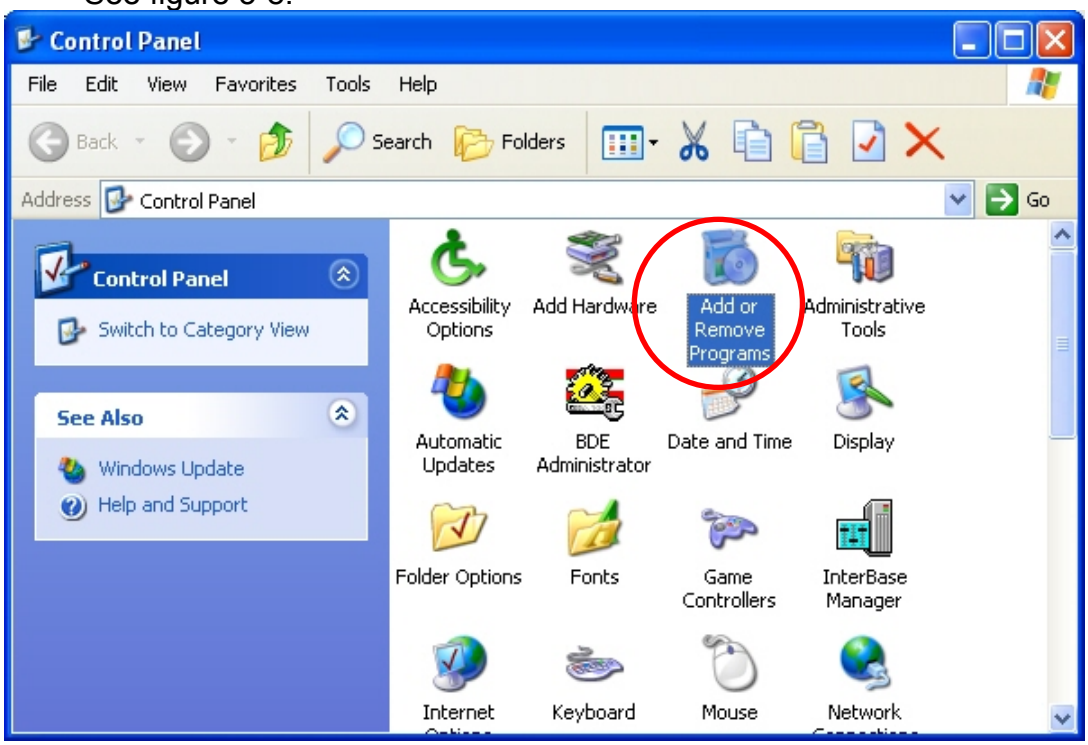


Figure 5-8: “Add or Remove Programs”

Step 3: Find out the I-7243D Utility, and click the Change/Remove button. See figure 5-9.

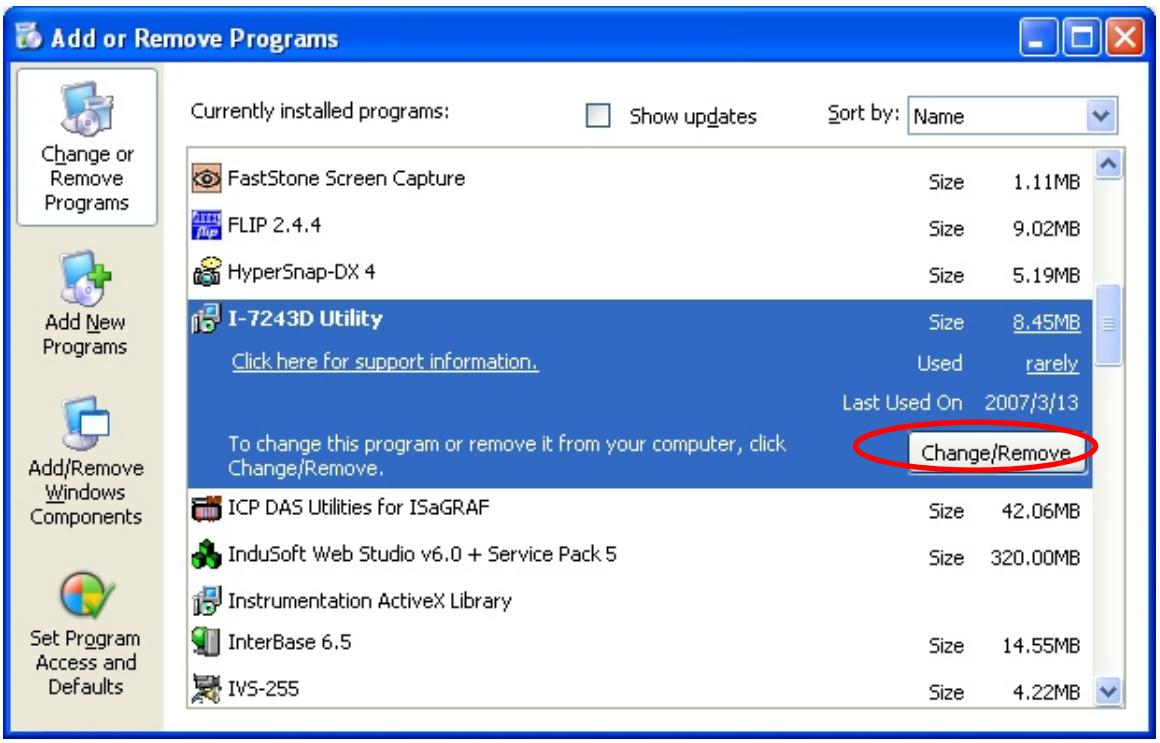


Figure 5-9: Click “Change/Remove” button

Step 4: Select the “Remove” option button, and press the “Next” button to remove I-7243D Utility. See figure 5-10.

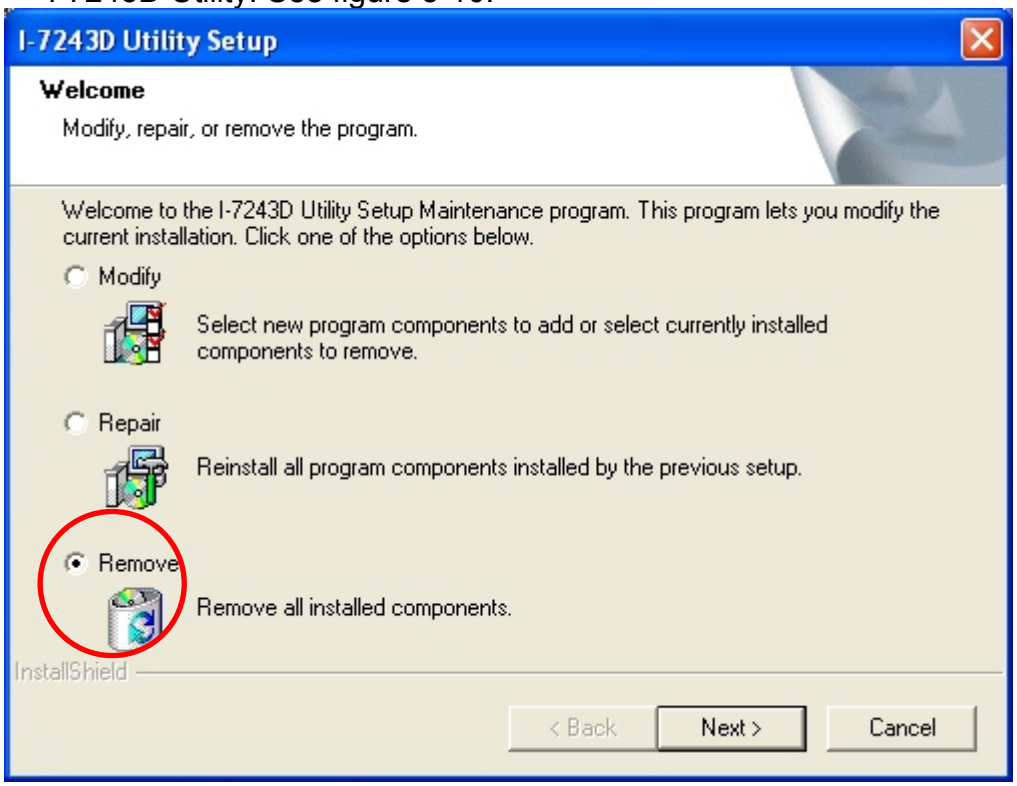

I-7243D Utility Setup
Welcome
Modify, repair, or remove the program.
Welcome to the I-7243D Utility Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.
Modify
Select new program components to add or select currently installed components to remove.
Repair
Reinstall all program components installed by the previous setup.
Remove
Remove all installed components.
InstallShield
< Back
Next >
Cancel

Figure 5-10: “Modify, repair, or remove the program” dialog

Step 5: Click the button “Yes” to remove the software as shown in figure 5-11.

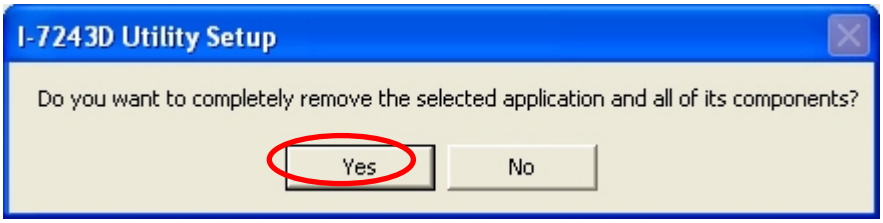


Figure 5-11: Click the button “Yes” to remove the software

Step 6: Finally, click the “Finish” button to finish the uninstall process.

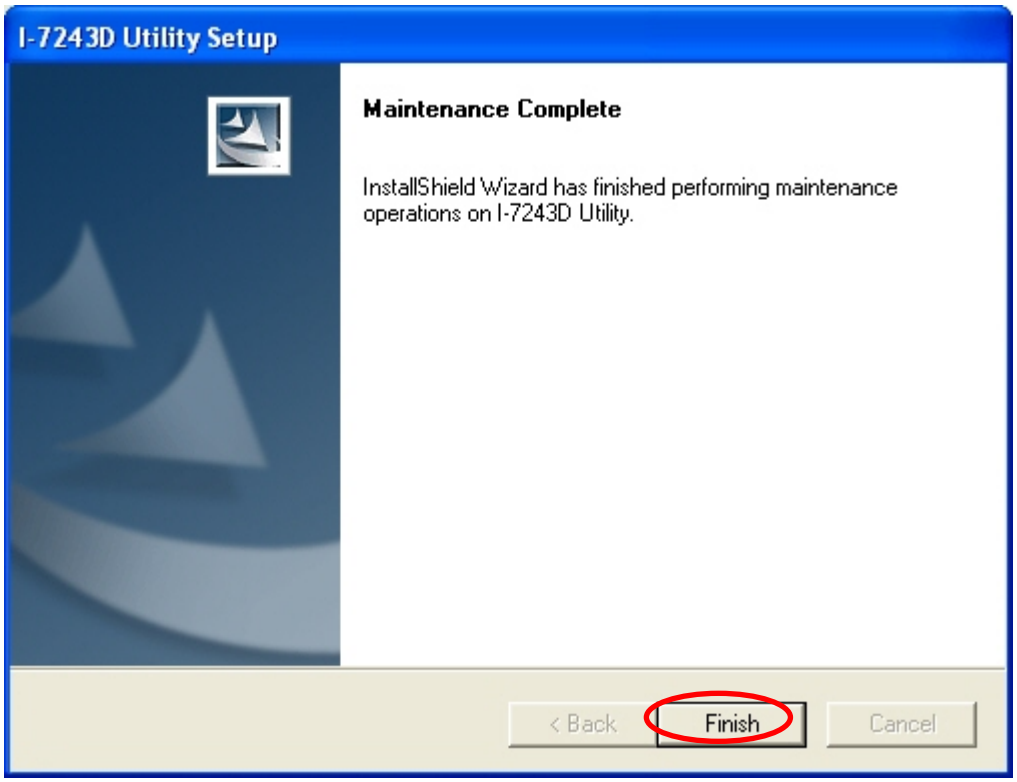
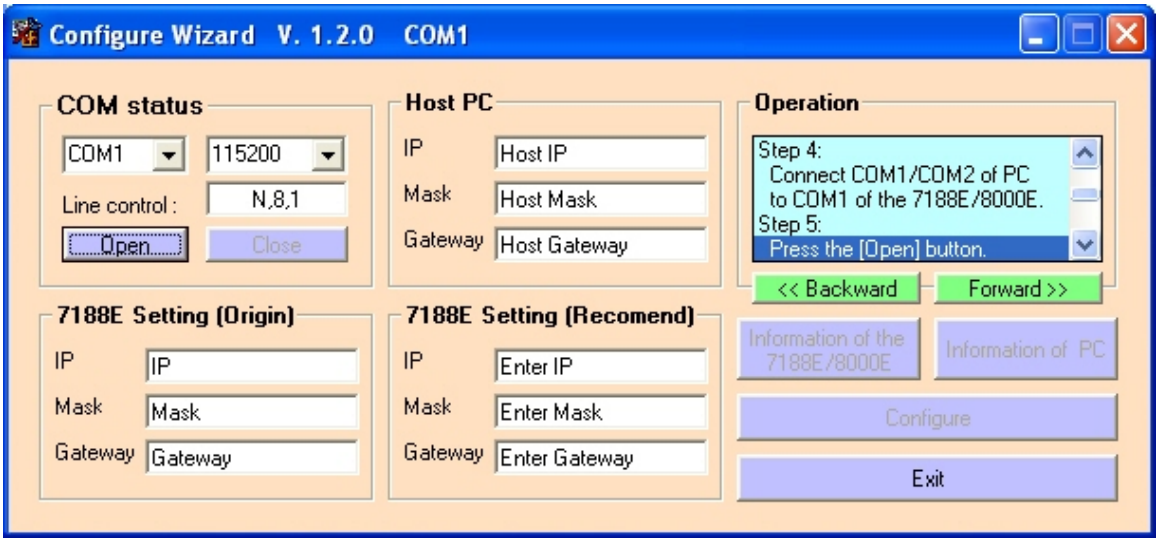


Figure 5-12: “Maintenance Complete” dialog.

5.1.2 How to set/connect with the module

When you first connect/install an I-7243D, you need to adjust each setting to suit your requirements. You only need to do this once. The following procedure will guide you on how to set and connect the I-7243D with Utility tools. The configuration steps are depicted as below:

1. Connect the power source (the 10~30 DC volts) into the I-7243D module.
2. Configure the network settings (IP, Mask, Gateway) for the I-7243D controllers.



To Use the Configuration Wizard, you must first install PCDiag.
(8000CD:\Napdos\7188e\TCP\PCDiag\Setup\Setup.exe)

3. After using configure wizard to set the network parameters of I-7243D, please power-off and power-on the power source of it again.
4. Then the I-7243D module's Power LED will flash approximately once per 0.5 second. And the 5-digits 7-segment LED will scroll to display some messages, please refer to section 2.3 to check what the status it is.
5. The user must run the I-7243D's Utility software after they have made a wire connection between the PC and the I-7243D via the network cable
6. Select the "Online" on the I-7243D Utility menu bar. Then click the "Connect" item. The "Connect…" window will be pop-up. Key-in the IP of the I-7243D and press the "Connect" button in order to connect with it. As shown in the following figure.

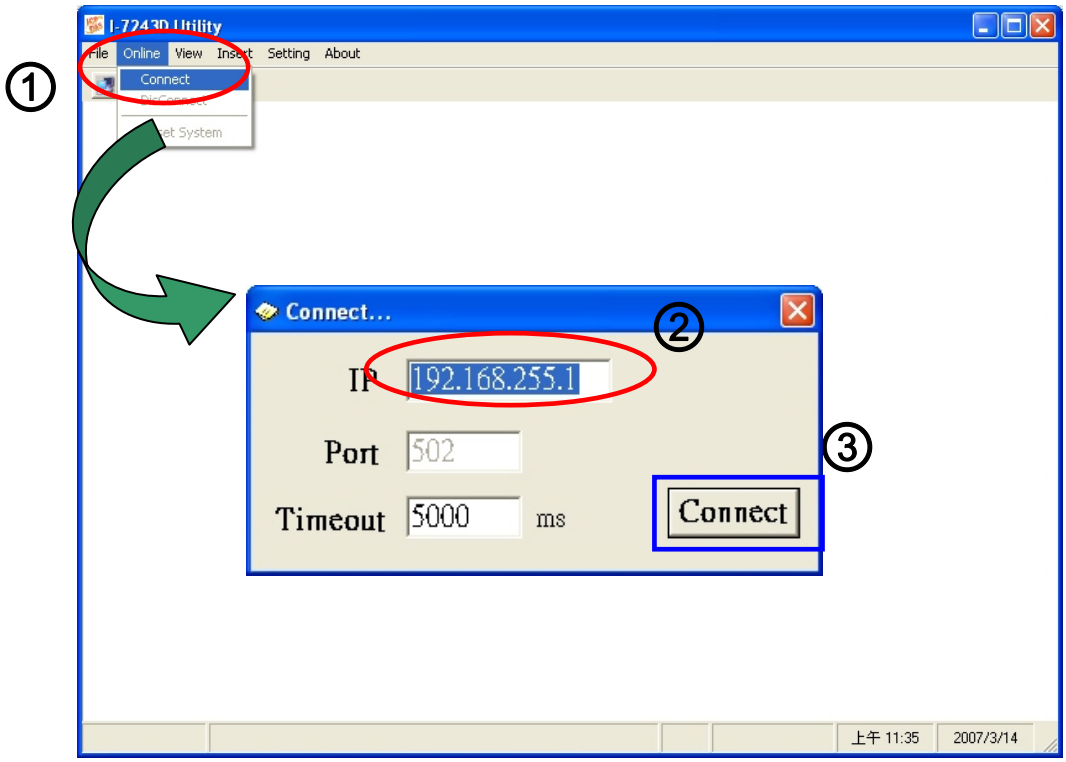


Figure 5-13: Connection setting of I-7243D

7. If the I-7243D is online and work normally, the Utility tool will display the connection state and devices at the main frame. Then users configure and set the I-7243D and its DeviceNet slaves devices at each configuration table. The main frame is shown in the following figure.

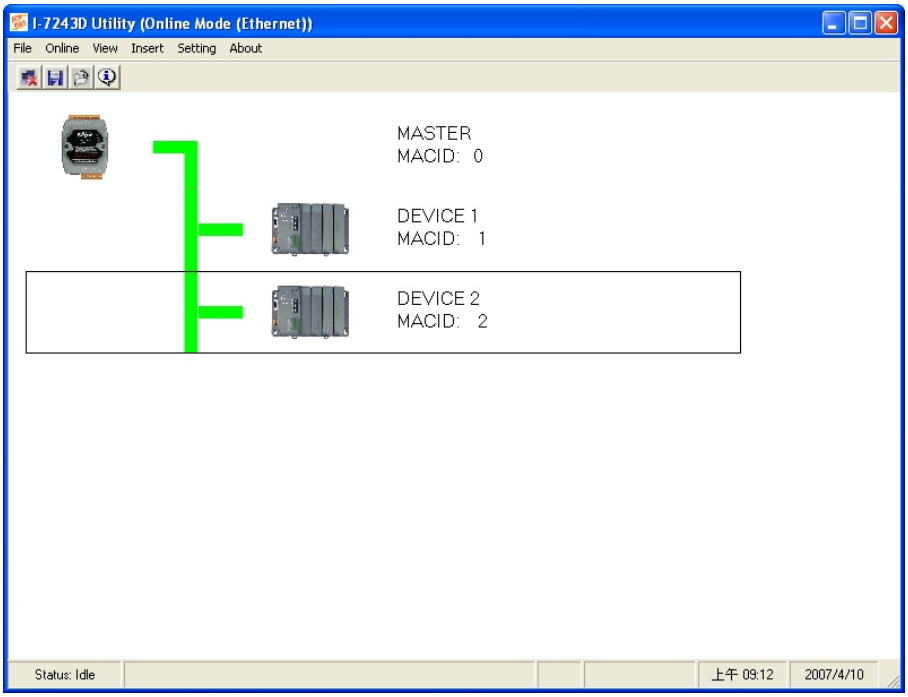


Figure 5-14: Connect to the configuration mode of the I-7243D

5.1.3 How to configure the module's DeviceNet MACID and Baud rate

Users can configure the I-7243D's DeviceNet MACID and Baud rate at the "Bus Parameters" Table. The setting of these two parameters will take affect after system is reset. Please do the following steps to change these two parameters.

1 Connect the I-7243D module with Utility tool, described as section 3.1.2.
2 Then select the master frame, I-7243D.
3 Select the "Setting" item on the menu bar, or click the mouse right-button on the master frame, then click the "Bus Parameters…" item. Then the "Bus Parameter" window will be pop-up. As shown in figure 5-15.

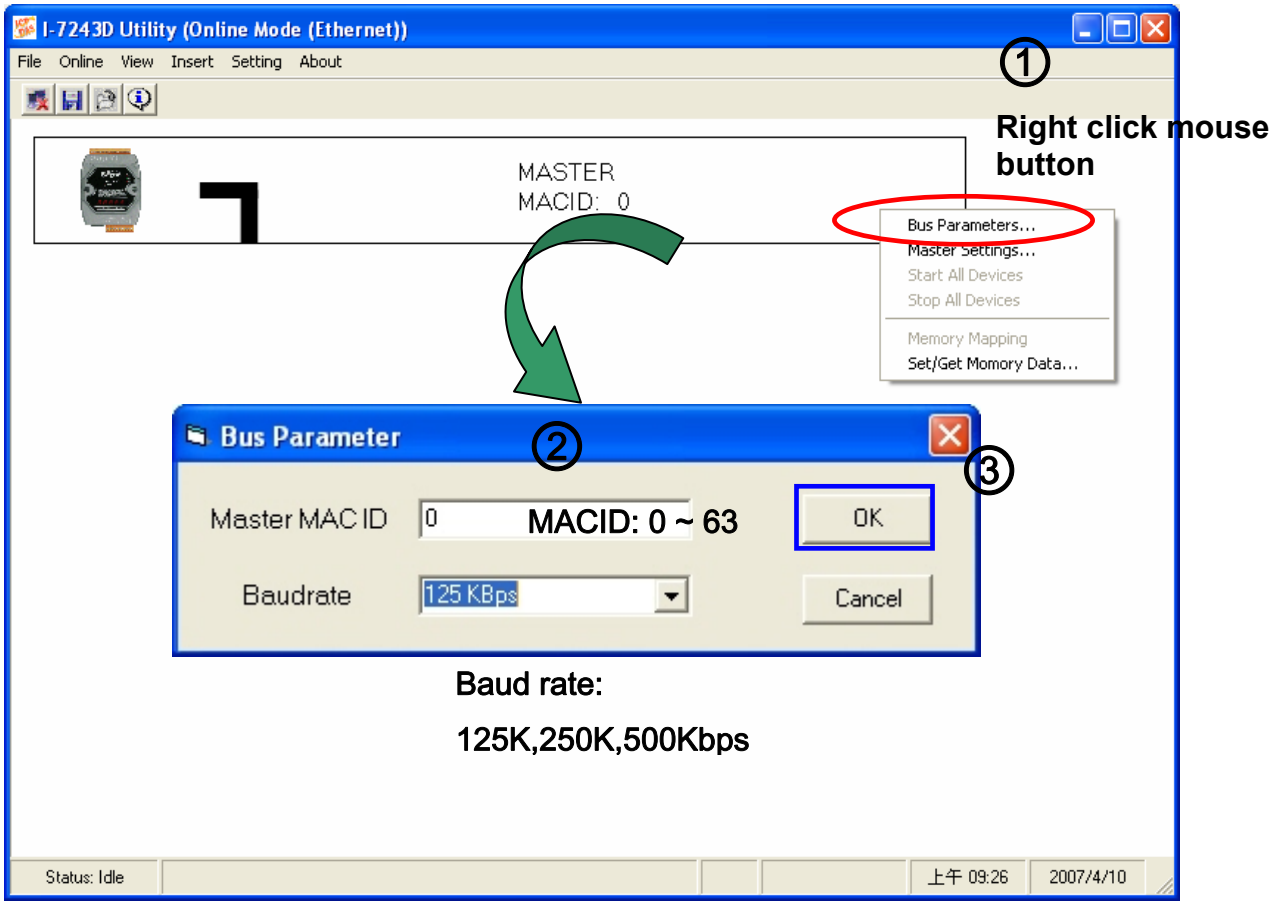


Figure 5-15: Setting of DeviceNet MACID and Baud rate

4 All setting will become affect after reset the system of the I-7243D.

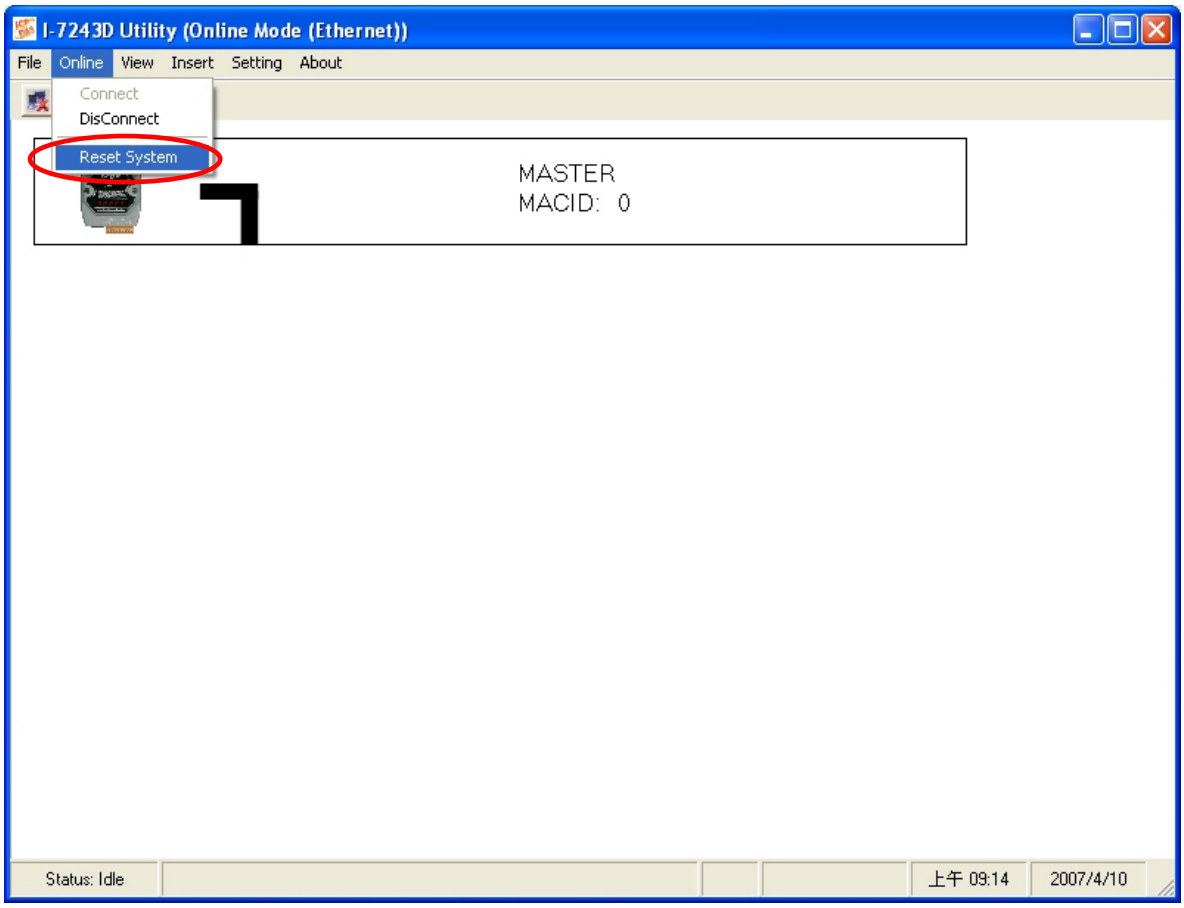


Figure 5-16: Reset the system of I-7243D

5.1.4 How to configure the module's application mode

The I-7243D can act as Modbus/TCP to multi-Modbus/RTU converter or protocol converter with VxComm technology. After connect I-7243D with Utility tool, users can change these application mode at the "MBTCP configuration Table". Please do the following steps to change the application mode of the I-7243D.

1. Connect the I-7243D module with Utility tool, described as section 5.1.2.
2. Then select the master frame, I-7243D.
3. Select the "Setting" item on the menu bar, or click the mouse right-button on the master frame, then click the "Master Settings…" item. Then the "MBTCP Configuration" window will be pop-up. As shown in figure 5-17.

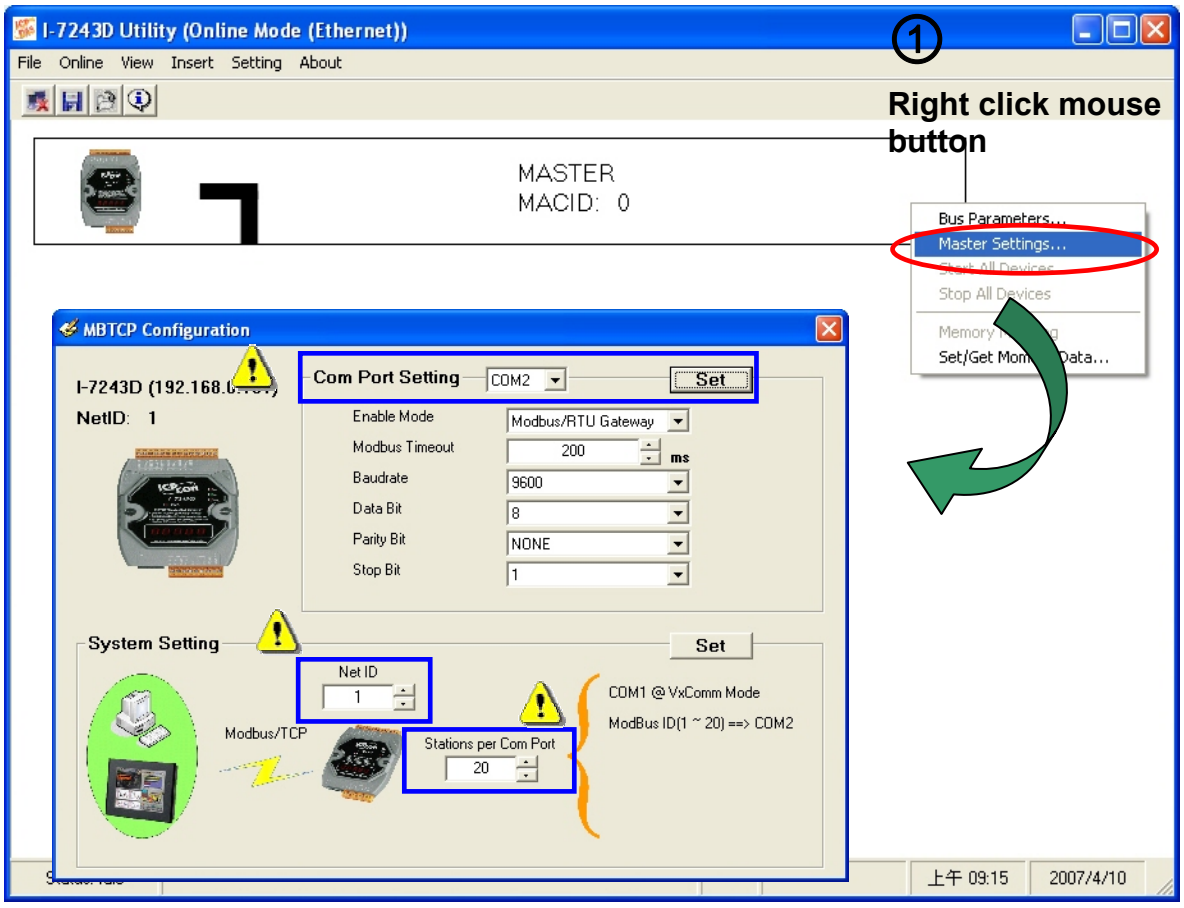


Figure 5-17: MBTCP Configuration

4. Adjust system settings:

The I-7243D can be a single-Modbus/TCP to multi-Modbus/RTU converter. The Modbus station number is a very important parameter. It is used to recognize different Modbus stations. But the I-7243D does not have any hardware design such as dip-switch or jump allowing you to set the Modbus station number (or called NetID). You must use the Utility to set some parameters regarding to Modbus station number. System settings include follows:

Net ID:

If the Modbus station number in a Modbus/TCP request (from PC or HMI) matches the Net ID, the request is passed to the Modbus kernel. Then Modbus kernel will then respond and send the internal registers (**DeviceNet devices parameters**) to the Modbus/TCP client (PC or HMI).

The content of all other registers are listed on the following section.

Station per Com Port:

This value is used to decide how many Modbus/RTU stations can one I-7243D COM port control. That also means the value can decide which COM the Modbus/TCP request will be passed to.

When click the "Set" button, the Utility shows the gateway mapping.

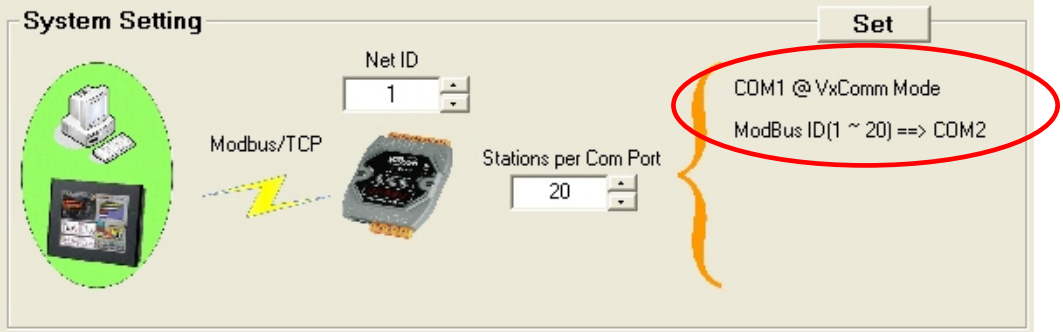


Figure 5-18: MBTCP System Setting

5. Adjust the COM port settings:

Enable Mode (Default = Modbus/RTU):

I-7243D COM ports can be configured as follows:

1. **VxComm (Virtual COM):**
   Enable VxComm. Remote application program can use Virtual COM (need to install the VxComm Driver) or connect to TCP/IP port 10000 + n to access the I-7243D COM port via Ethernet. At VxComm mode, the COM port can link to any serial device.
2. **Modbus/RTU Gateway:**
   Enable protocol gateway function to convert Modbus/TCP to Modbus/RTU. At Modbus/RTU mode, the COM port can only link to Modbus/RTU slave devices.
3. **No Use:**
   Disable communication of the COM port.
4. **UpLink:**
   Enable the COM port to be a Modbus/RTU slave port.
5. **Debug port**
   The Modbus kernel prints out some messages while communicating with Modbus clients or masters.
   The messages includes
   - (0) receives Modbus request
     response to Modbus clients or masters
   - (1) by passes Modbus request to COM port
   - (2) Send Modbus request to COM port
   - (3) Check Modbus response from COM port
   - (4) Send Modbus response to Modbus client or masters

Data format of Modbus/RTU

There are several kinds of data format used in the Modbus/RTU protocol, you must change it to suit the Modbus/RTU devices that connect to the COM port.

8 data bits, none parity, 1 stop bits (Default)
8 data bits, none parity, 2 stop bits
8 data bits, odd parity, 1 stop bits
8 data bits, even parity, 1 stop bits

Note: When an I-7243D receives a Modbus/TCP request that not to its internal registers, it first decides which COM port to send the request. Modbus/RTU must be enabled for this COM port, otherwise the request will be discarded.

Timeout (Default = 200 ms):

After finishing data transmission, the system begins to count time, if timeout expires, the system stop receiving responses.

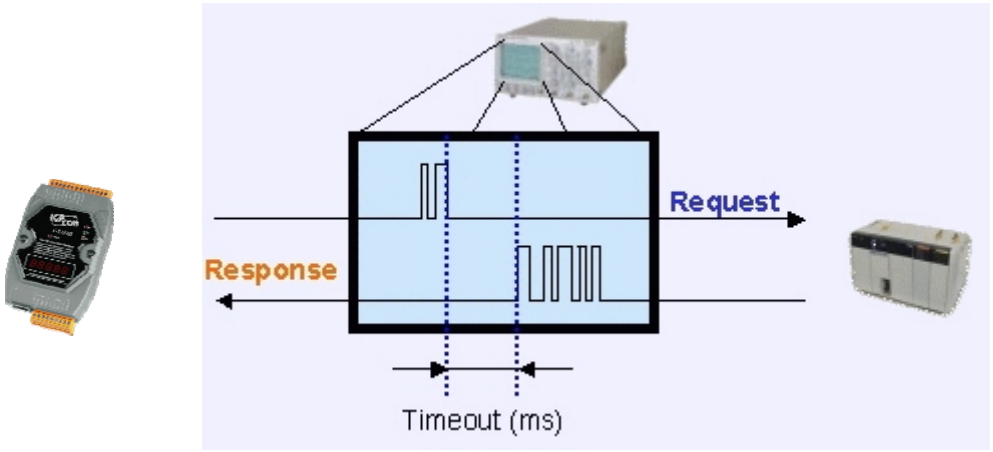


Figure 5-19: Request/response Timeout

5.1.5 How to add/remove/configure DeviceNet devices

On the main frame of I-7243D Utility tool, users can add/remove/configure the DeviceNet devices by select the necessary items.

Add a DeviceNet device:

Click left of the mouse button on the black space of main frame. Select the "Insert" item on the menu bar, or click right of the mouse button on the black space of main frame, then click the "Device" item. Then the "Insert Device" window will be pop-up. As shown in figure 5-20.

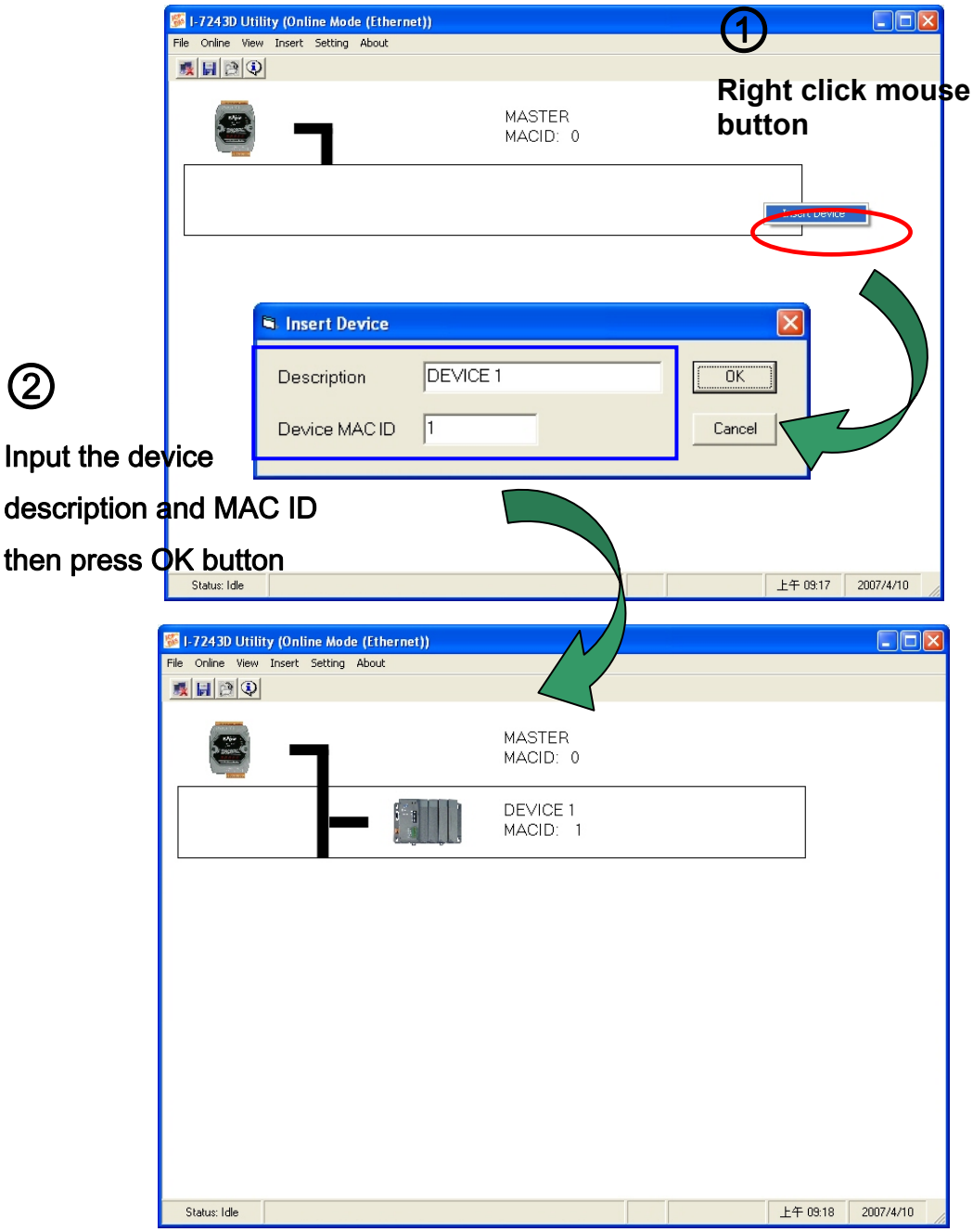


Figure 5-20: Add a DeviceNet device into I-7243D

Remove a device:

Click left of the mouse button on device that you want to remove. Click right of the mouse button on the device, then click the “Delete” item. Then the selected device will be removed from the I-7243D. As shown in figure 5-21.

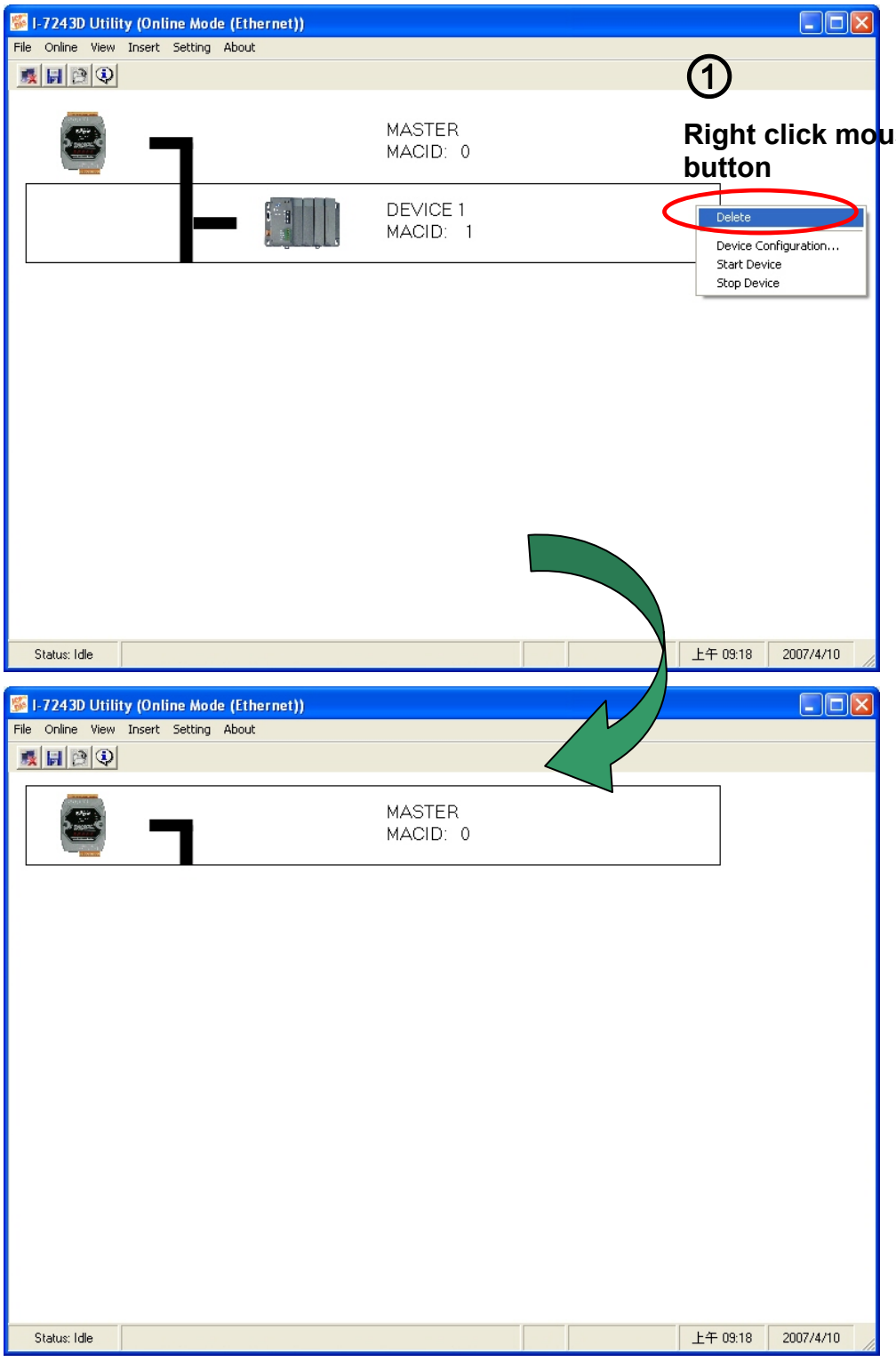


Figure 5-21: Remove a DeviceNet device from I-7243D

Configure all devices:

1. Click left of the mouse button on device that you want to configure. Select the "Setting" item on the menu bar, or click right of the mouse button on the device, then click the "Device Configuration…" item. Then the "Device Configuration" window will be pop-up. As shown in figure 5-22.

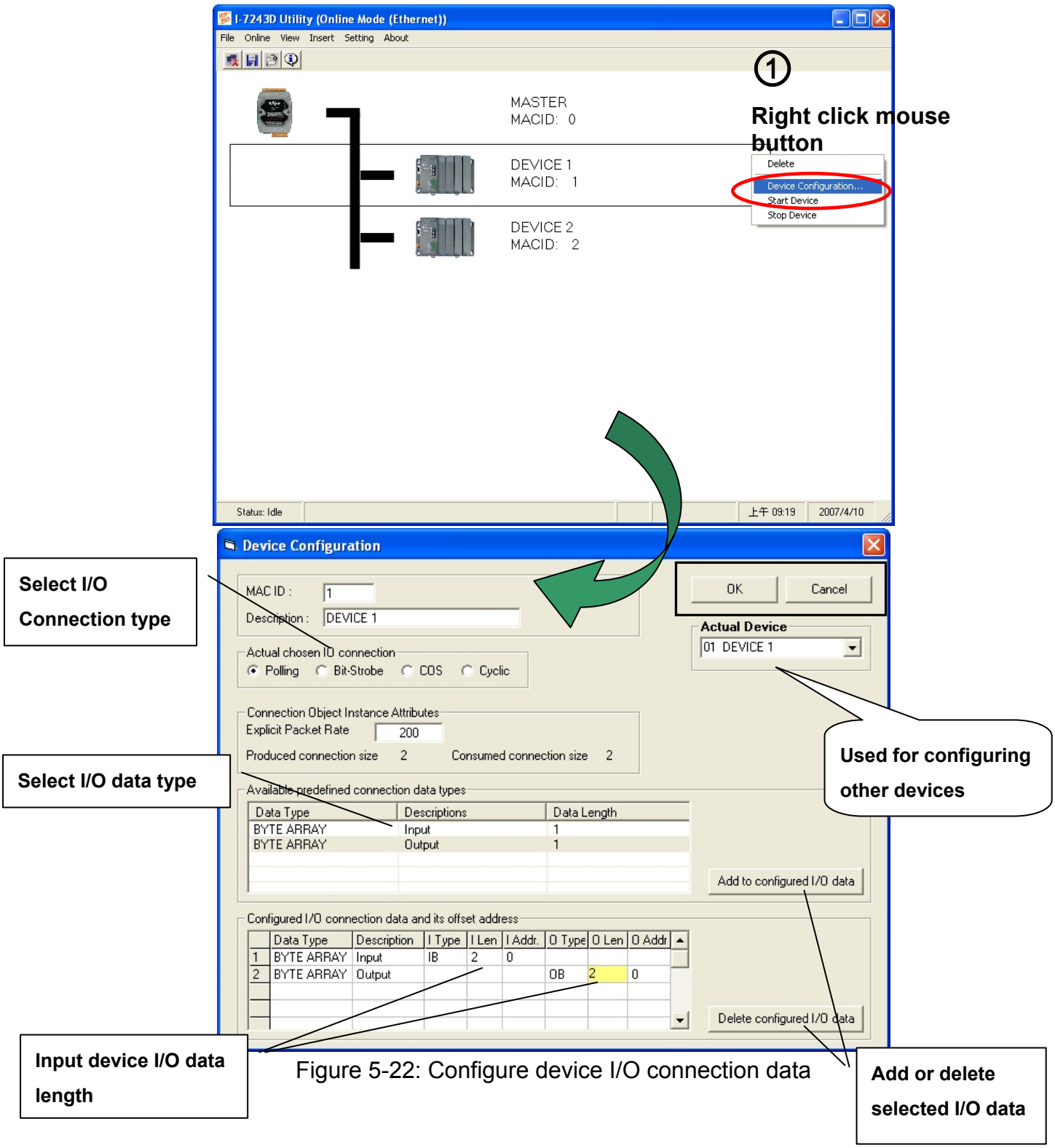


Figure 5-22: Configure device I/O connection data

2. After pressing “OK” button to finish the setting of all actual devices, Utility tool will save all setting into I-7243D’s EEPROM and I-7243D start to communicate with these devices automatically. Then the I-7243D Utility tool will display each configured device’s connection status on the main frame and update the device connection information per 0.8 second. As shown in figure 5-23.

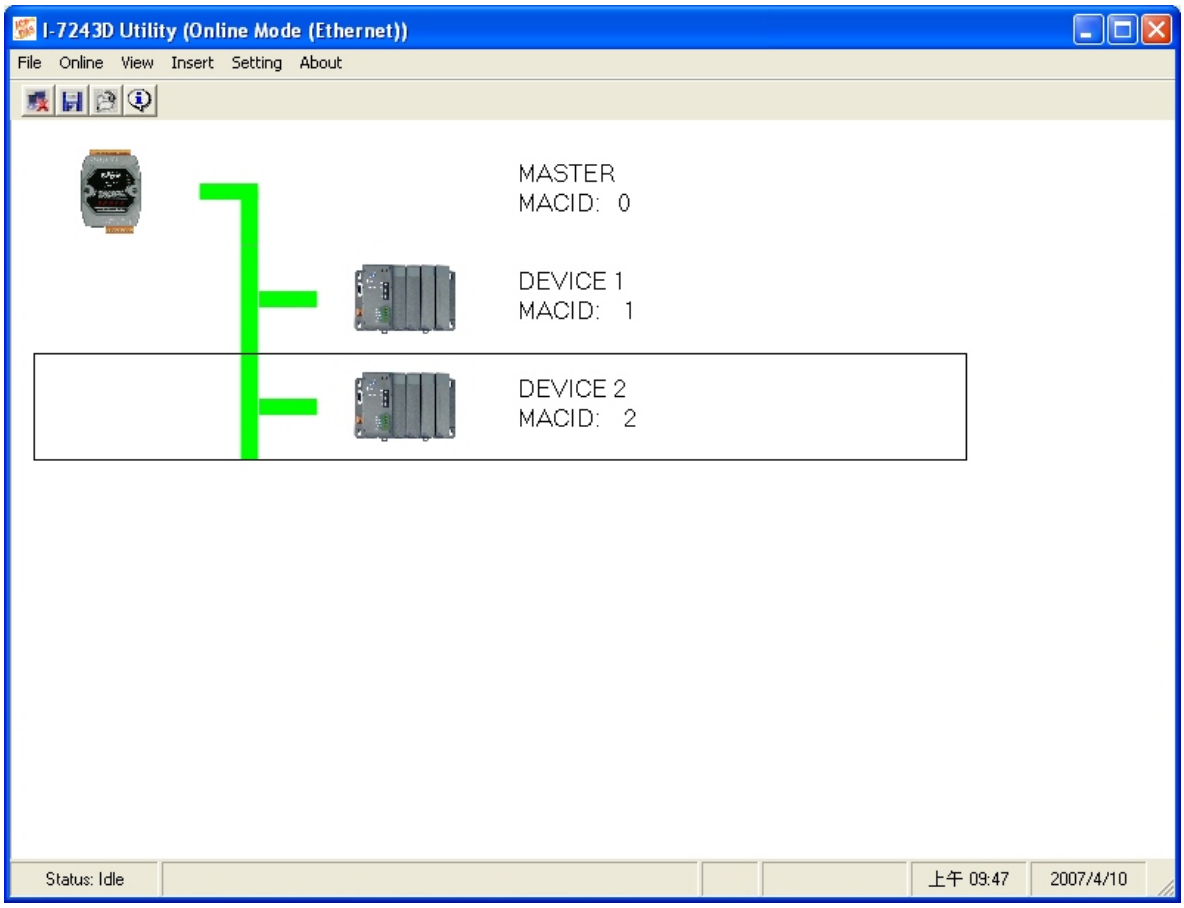


Figure 5-23: Start to monitor the connection status of each device

5.1.6 How to start/stop to communicate with DeviceNet devices

After setting all the DeviceNet devices on the “Device Configuration” window, the I-7243D will start to communicate with the devices. If there is no error occurs on these devices, the color of the line picture between I-7243D and DeviceNet devices will be green. Otherwise, it will become red color. If users stop the communication of some other devices, the color of the line picture will become black.

Users can follow the steps to start or stop the communication of each or every DeviceNet devices.

1. Click left of the mouse button on device that you want to start or stop. Select the “Setting” item on the menu bar, or click right of the mouse button on the device, then click the “Start Device” item or “Stop Device”. Then the I-7243D will start/stop to communicate with the DeviceNet device. As shown in figure 5-24.

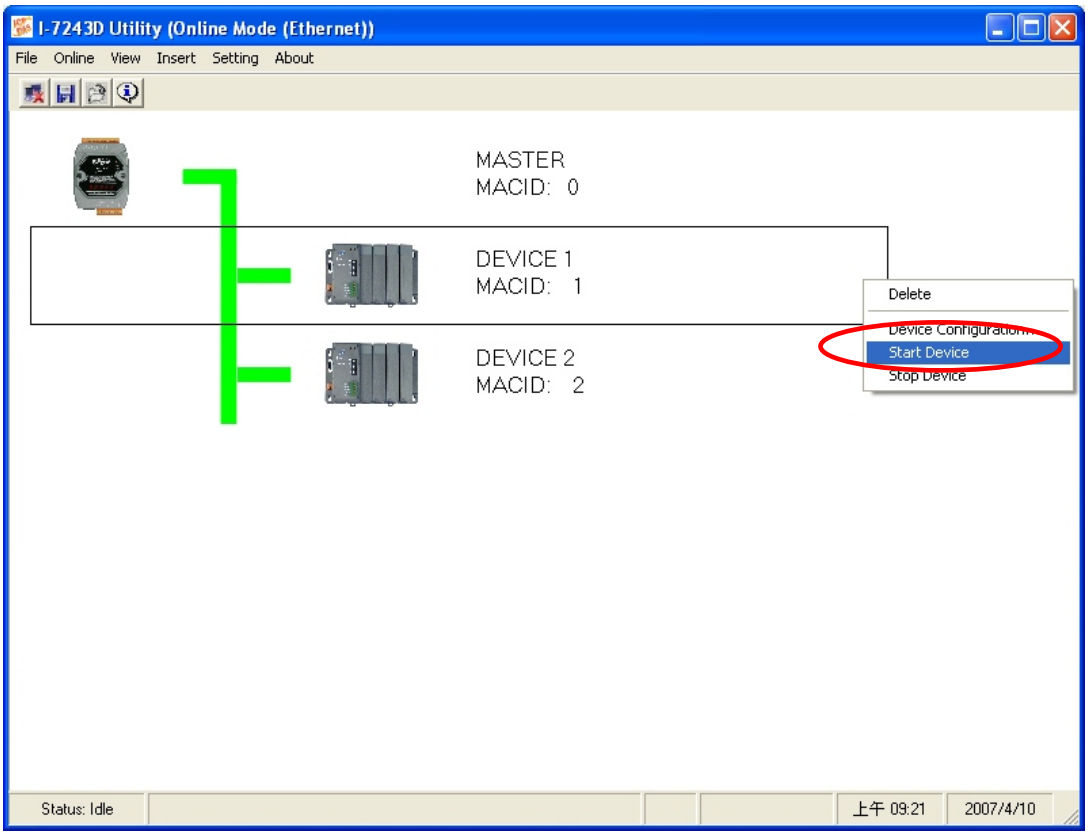


Figure 5-24: Start/stop communisating with DeviceNet devices

2. By Clicking left of the mouse button on master frame, I-7243D, you can start or stop communicating with all DeviceNet devices. Select the “Setting” item on the menu bar, or click right of the mouse button on the master frame, then click the “Start All Devices” item or “Stop All Device”. Then the I-7243D will start/stop communicating with all DeviceNet devices. As shown in figure 5-25.

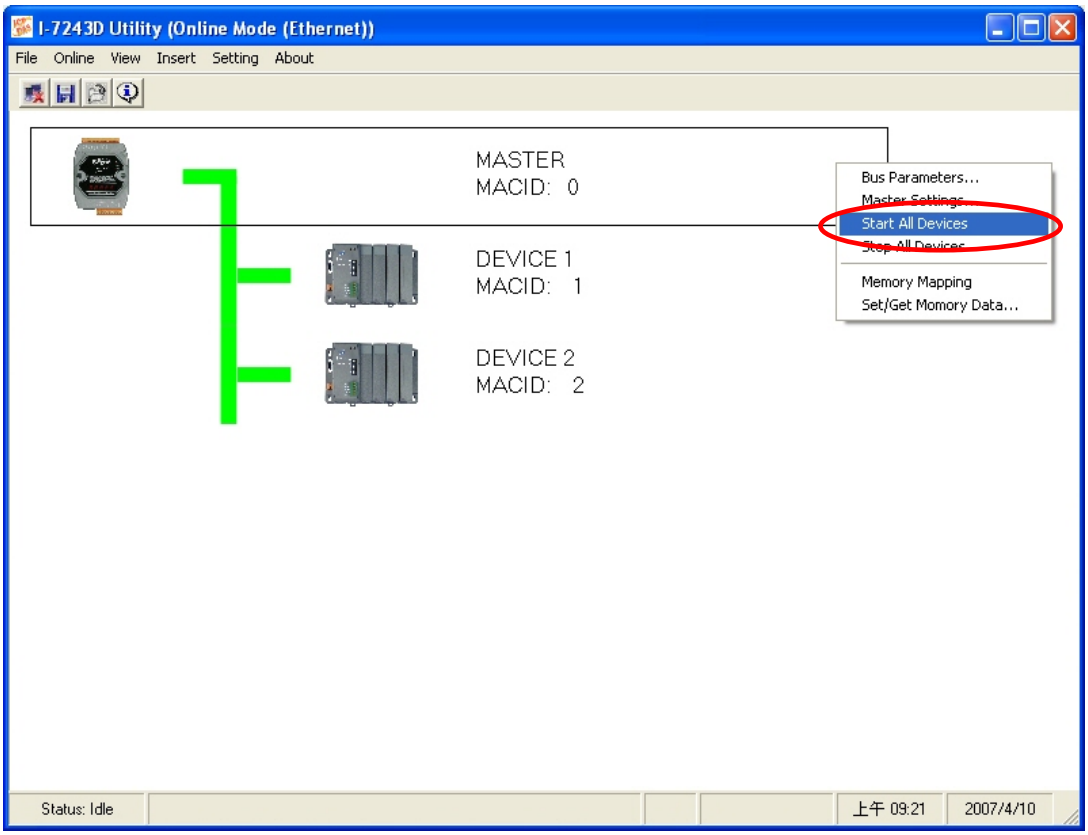


Figure 5-25: Start/stop communicating with all DeviceNet devices

5.1.7 How to get the configuration/status of each DeviceNet device

After configuring the DeviceNet device, the Utility tool will let the I-7243D start to communicate with these devices. Every 0.6 second, the Utility tool will use Modbus/TCP commands to communicate with I-7243D and get these DeviceNet devices' information. Users can get the configuration and status of these devices by looking the "Device Table", "Address Table" and "Status Table" over. As shown in figure 5-26, 5-27, 5-28.

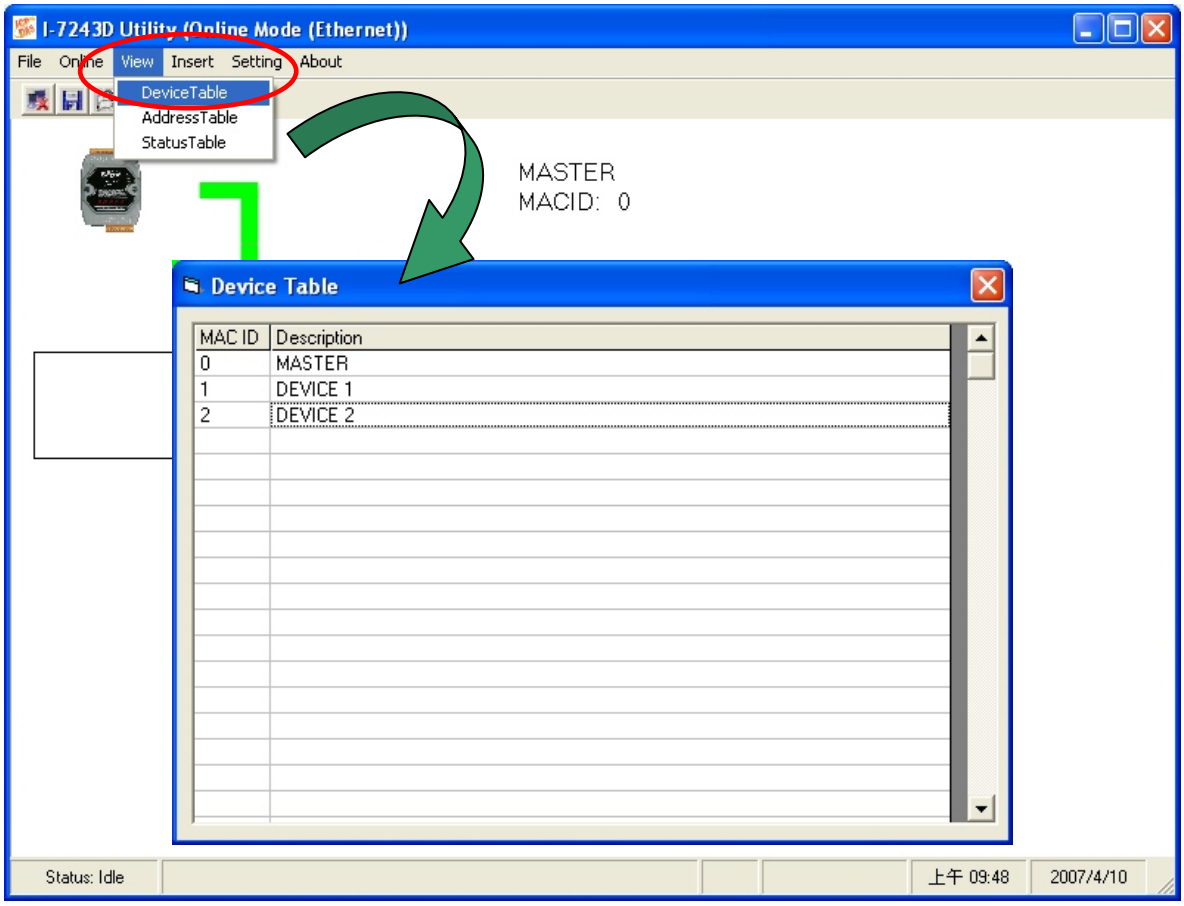


Figure 5-26: Device Table

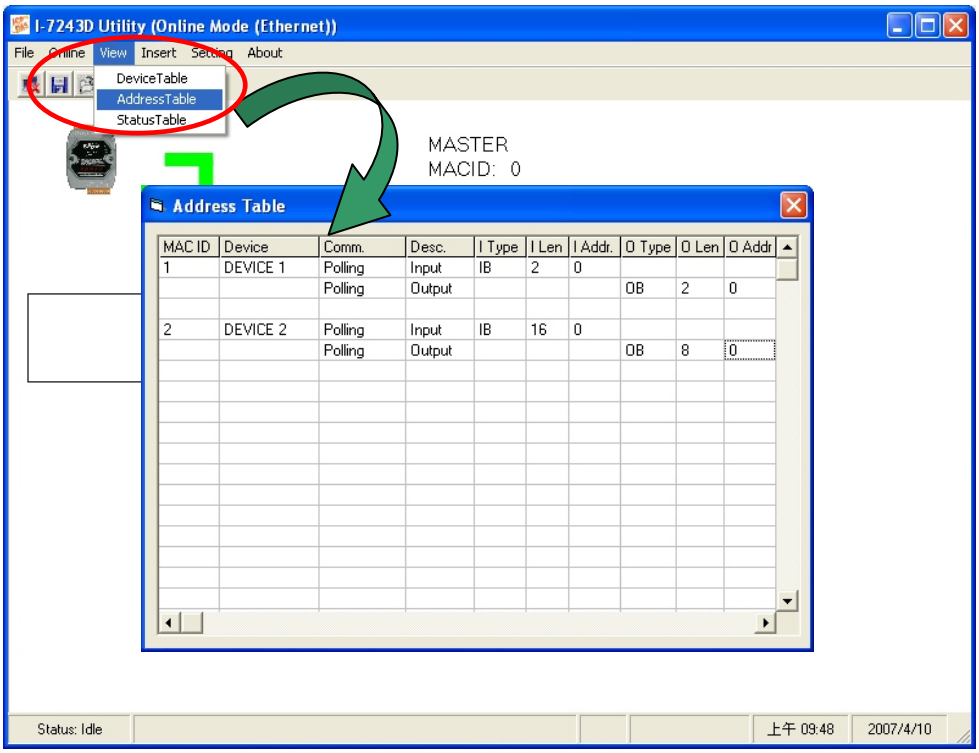

I-7243D Utility (Online Mode (Ethernet))
File Online View Insert Setting About
DeviceTable
AddressTable
StatusTable
MASTER
MACID: 0
Address Table
MAC ID | Device | Comm. | Desc. | I Type | I Len | I Addr. | O Type | O Len | O Addr
1 | DEVICE 1 | Polling | Input | IB | 2 | 0
Polling | Output | OB | 2 | 0
2 | DEVICE 2 | Polling | Input | IB | 16 | 0
Polling | Output | OB | 8 | 0
Status: Idle
上午 09:48
2007/4/10

Figure 5-27: Address Table

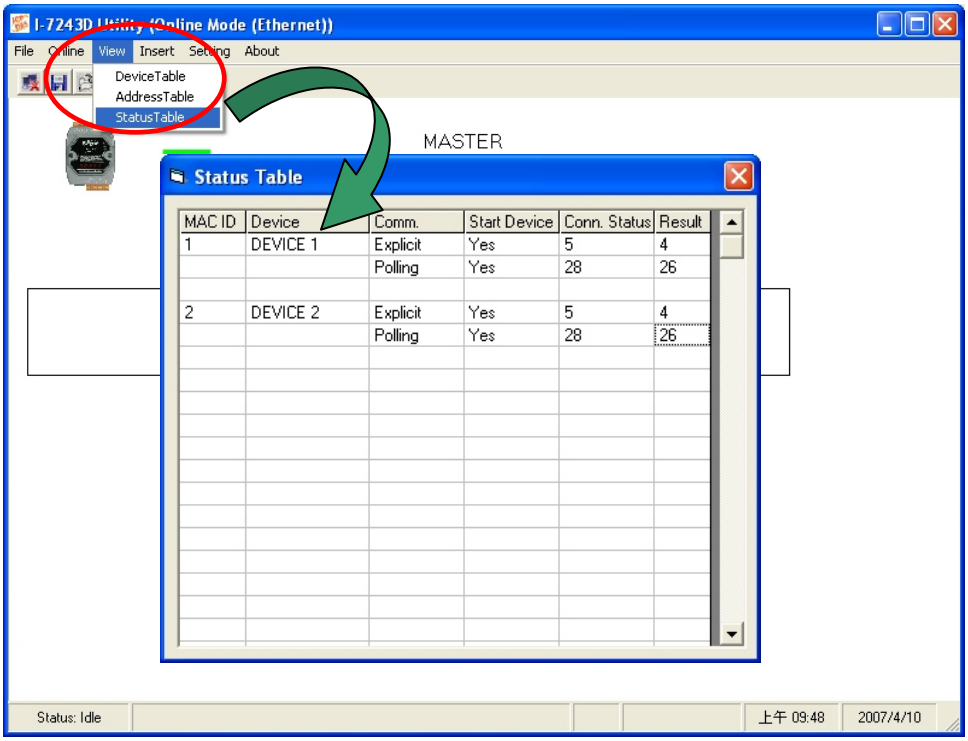

I-7243D Utility (Online Mode (Ethernet))
File Online View Insert Setting About
DeviceTable
AddressTable
StatusTable
MASTER
Status Table
MAC ID | Device | Comm. | Start Device | Conn. Status | Result
1 | DEVICE 1 | Explicit | Yes | 5 | 4
Polling | Yes | 28 | 26
2 | DEVICE 2 | Explicit | Yes | 5 | 4
Polling | Yes | 28 | 26
Status: Idle
上午 09:48
2007/4/10

Figure 5-28: Status Table

Please refer to the appendix A, B to get the meaning of each "Conn. Status" and "Result" on the Status Table.

5.1.8 How to get the I/O data of each DeviceNet device

The I-7243D supports an “Internal Memory” for saving I/O data. The input and output data areas are set to a maximum size of 512 bytes each. After using Utility tool to set the memory mapping of the I/O devices, users can get/set the I/O data according to the mapping address of each I/O data. When accessing these areas, with Modbus commands, the addressing is according to the following tables.

Users can use Modubs Function code 4, read input registers, to get the input data values from I-7243D’s input data area.

Word Address (3xxxx)	Byte Address	
0000h	0000h	0001h
0001h	0002h	0003h
0002h	0004h	0005h
: :	: :	: :
00FFh	01FEh	01FFh

Table 5-1: Input Addressing

Users can use Modbus Function code 16, force multiple registers, to set the output data values into I-7243D’s output data area.

Word Address (4xxxx)	Byte Address	
0000h	0000h	0001h
0001h	0002h	0003h
0002h	0004h	0005h
: :	: :	: :
00FFh	01FEh	01FFh

Table 5-2: Output Addressing

Setting the Input/output data area of the I-7243D's internal memory

After configuring the DeviceNet devices, user can set the input/output data area of I-7243D's internal memory. The steps are shown in the following figure.

1. Select the master frame, I-7243D
2. Select the "Setting" item on the menu bar, or click the mouse right-button on the master frame, then click the "Memory mapping" item. Then the "Internal Memory Configuration" window will be pop-up. As shown in figure 5-29.

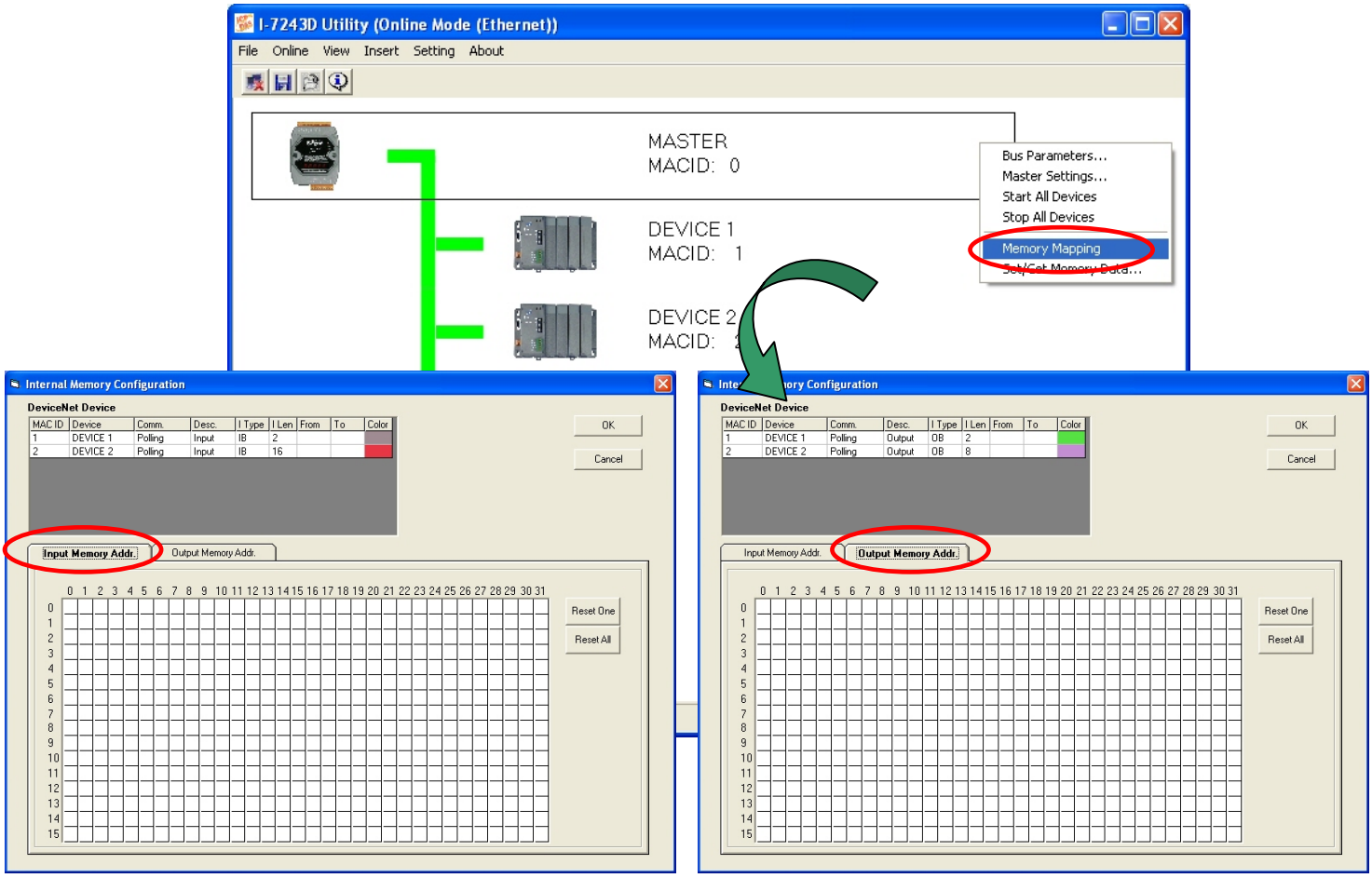


Figure 5-29: Internal Memory Configuration

3. Then users can configure the DeviceNet input devices into Input memory address or the DeviceNet output devices into output memory address. As shown in figure 5-30, 5-31.

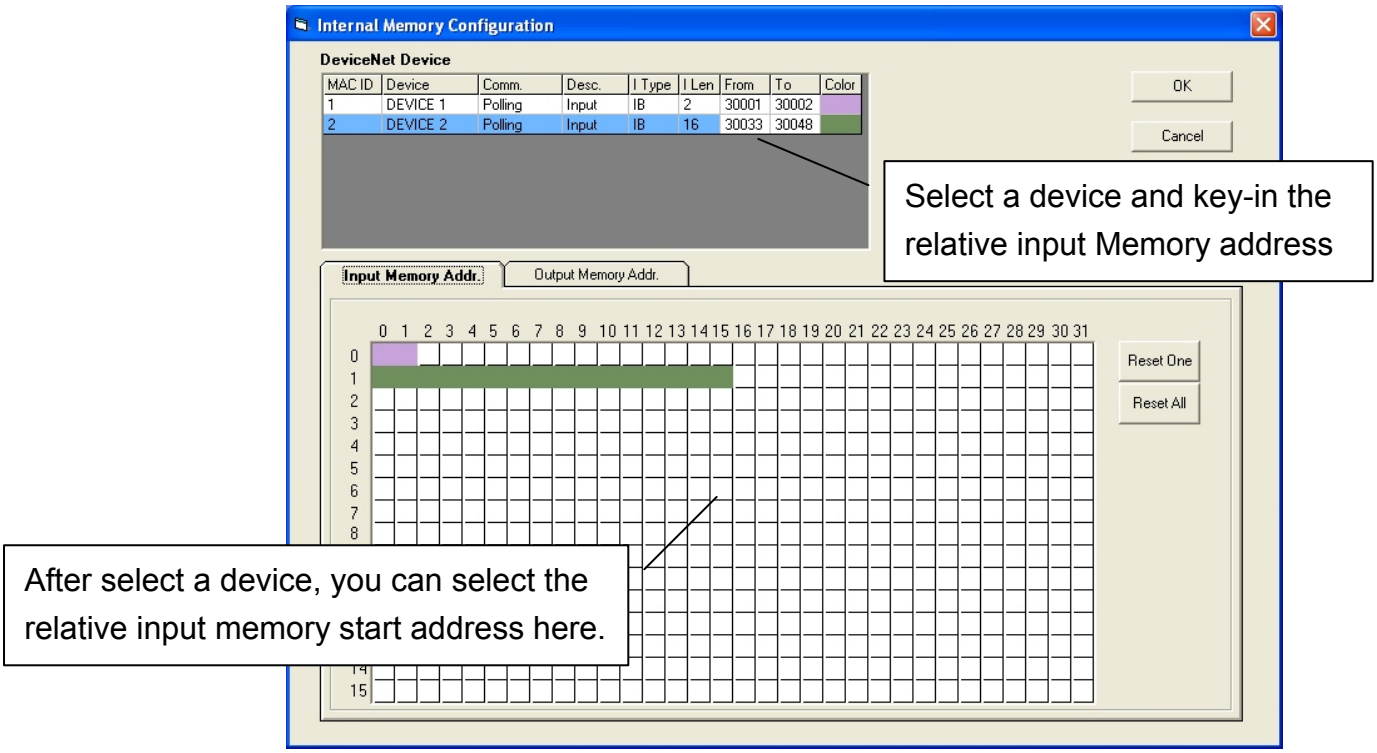

Internal Memory Configuration
DeviceNet Device
MAC ID Device Comm. Desc. I Type I Len From To Color
1 DEVICE 1 Polling Input IB 2 30001 30002
2 DEVICE 2 Polling Input IB 16 30033 30048
OK
Cancel
Select a device and key-in the relative input Memory address
Input Memory Addr.
Output Memory Addr.
Reset One
Reset All
After select a device, you can select the relative input memory start address here.

Figure 5-30: Input Memory Address

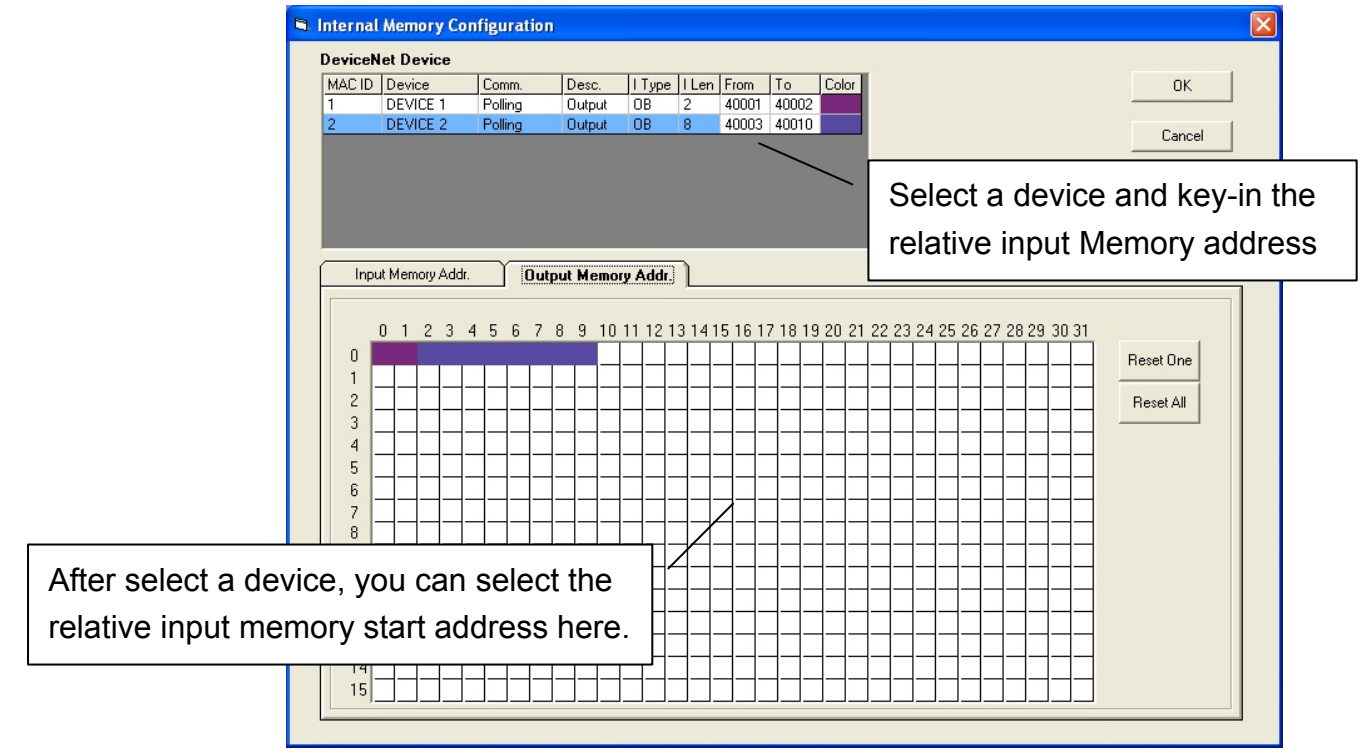

Internal Memory Configuration
DeviceNet Device
MAC ID Device Comm. Desc. I Type I Len From To Color
1 DEVICE 1 Polling Output OB 2 40001 40002
2 DEVICE 2 Polling Output OB 8 40003 40010
OK
Cancel
Select a device and key-in the relative input Memory address
Input Memory Addr.
Output Memory Addr.
Reset One
Reset All
After select a device, you can select the relative input memory start address here.

Figure 5-31: Output Memory Address

The “Reset One” and “Reset All” buttons are used for clear the memory address setting of each and every selected device. After the setting of the input/output memory address, please press the “OK” button to save the setting into the I-7243D’s EEPROM.

Get/set devices input/output data into I-7243D's input/output data area.

By using Utility tool, users can get/set data from the I-7243D's input/output data area via Mosbus/TCP command. If the I-7243D starts to communicate with the DeviceNet devices, all setting values on the output data area will be sent to the relative DeviceNet output devices. And the relative input data of DeviceNet input device will be saved into the input data area that you set. Please do the following steps to get/set the I/O data.

1. Select the master frame, I-7243D
2. Select the "Setting" item on the menu bar, or click the mouse right-button on the master frame, then click the "Set/Get Memory Data…" item. Then the "Set / Get IO Memory Data" window will be pop-up. As shown in figure 5-32.

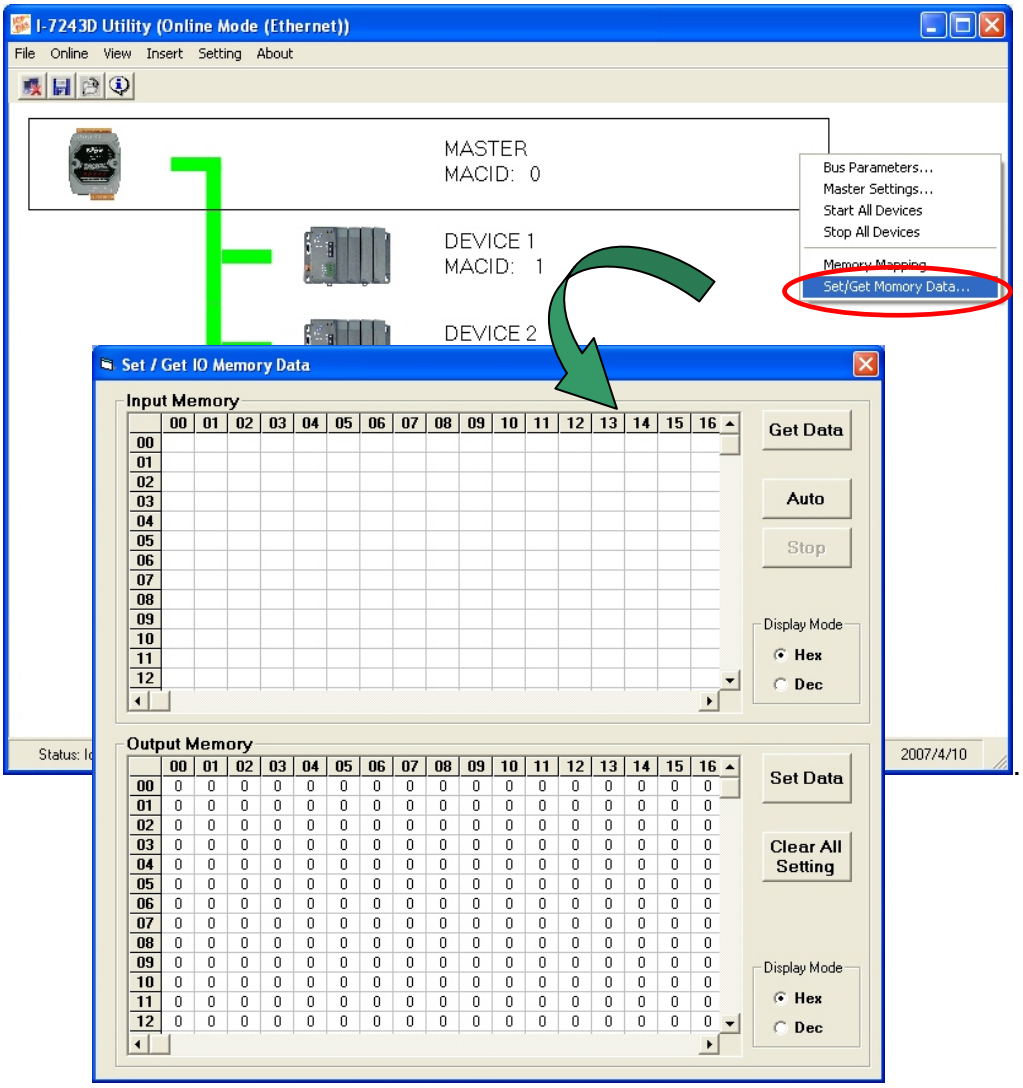


Figure 5-32: Set/Get IO Memory Data

As the setting of figure 5-30 and 5-31, users can get the Device1, 2 bytes polling input data, and Device2, 16 bytes polling data, on the Input Memory Table, 0000~0001 and 0100~0115 after click the “Get Data” button or “Auto button”. As shown in figure 5-33.

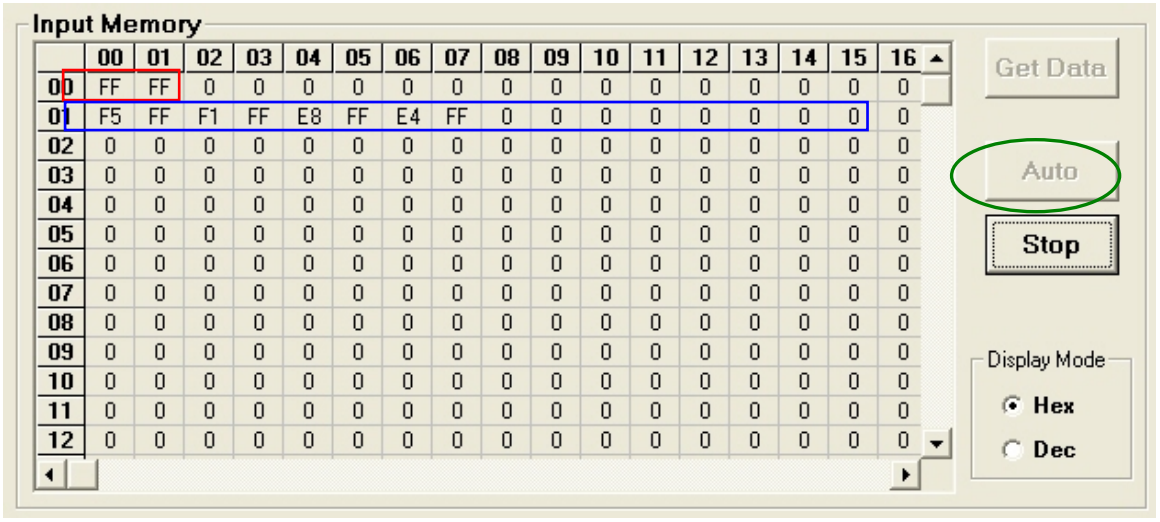


Figure 5-33: Input Memory Table

By clicking the “Set Data” button, users also can set the data on the Output Memory Table into I-7243D’s output data area. As shown in figure 5-34.

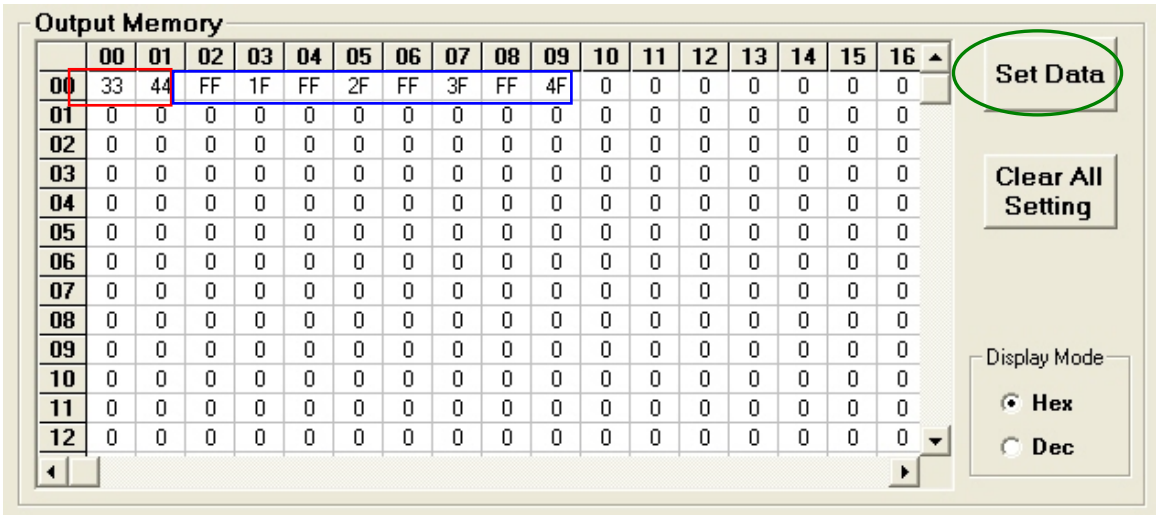
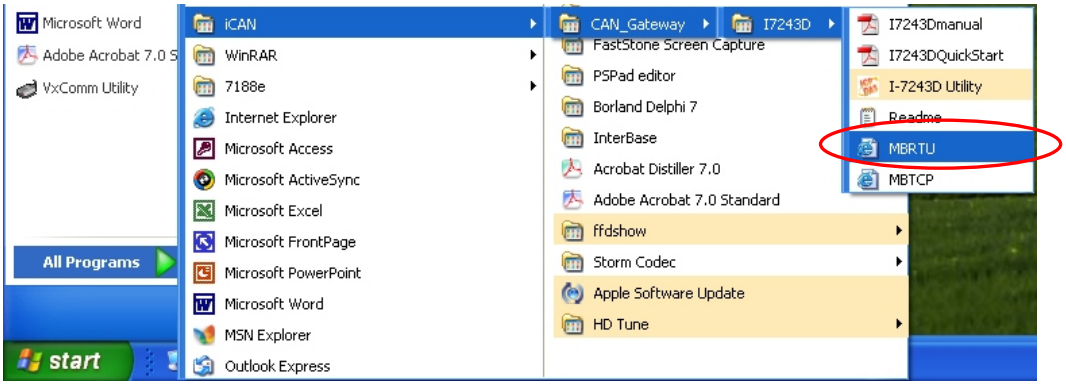
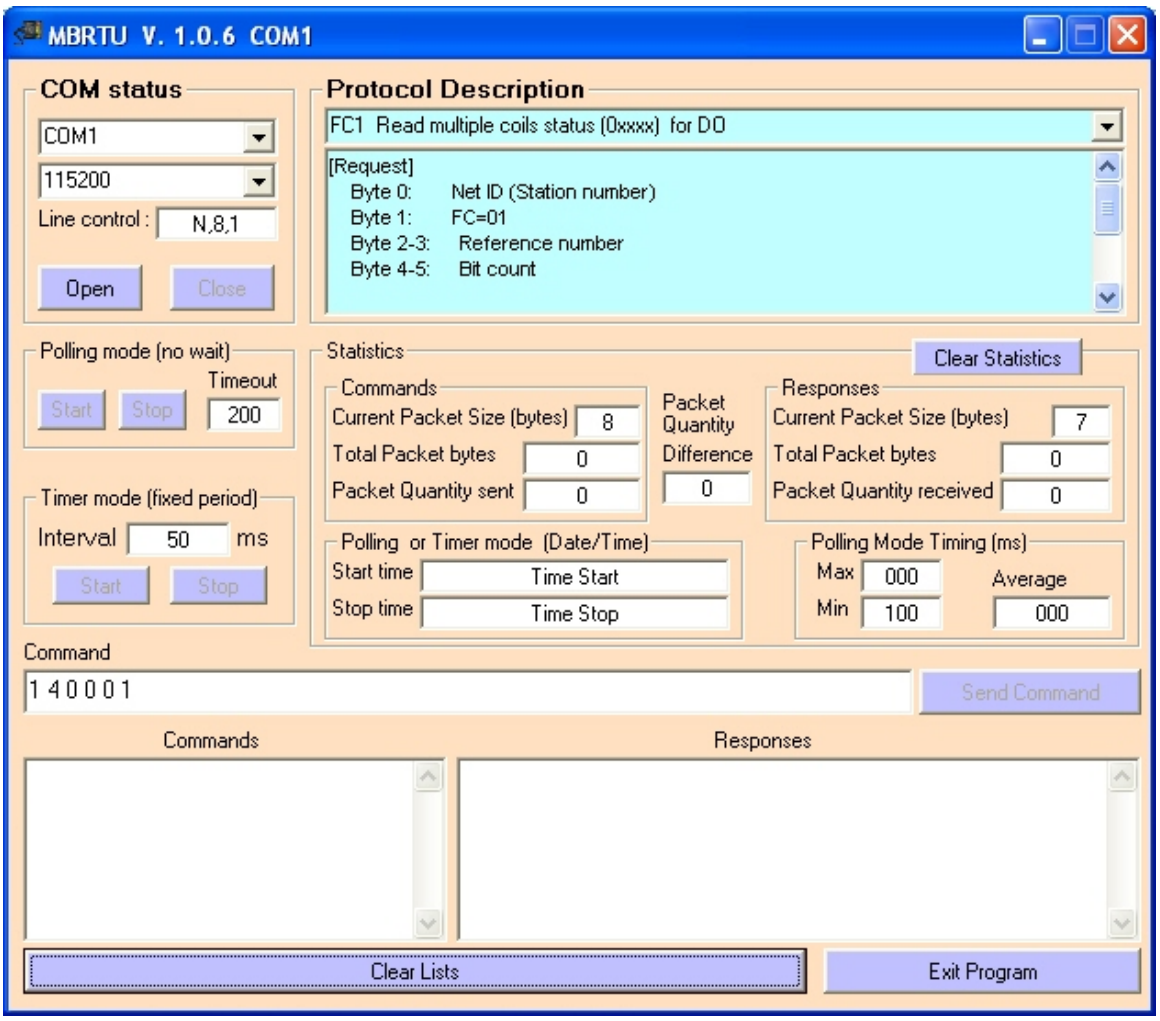


Figure 5-34: Output Memory Table

5.2 MBRTU Tool

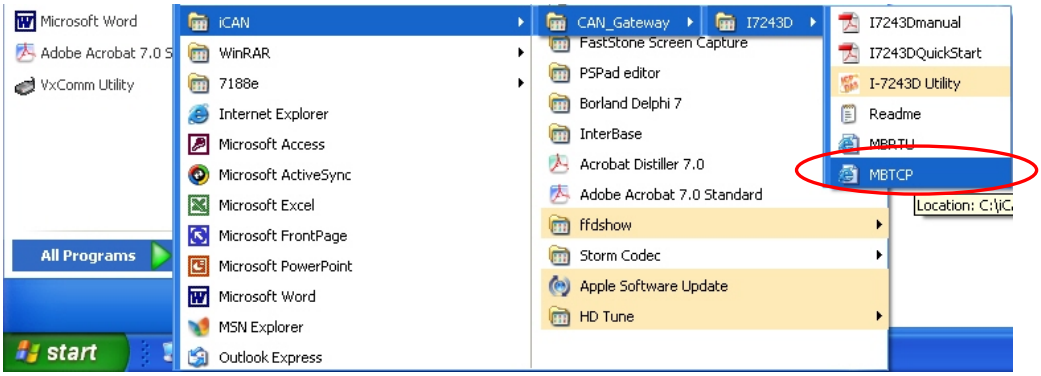
MBRTU: Modbus/RTU client (with source code in VB6) to diagnostic Modbus/RTU slave devices. After installing the I-7243D Utility tool, users can get it from the following location.

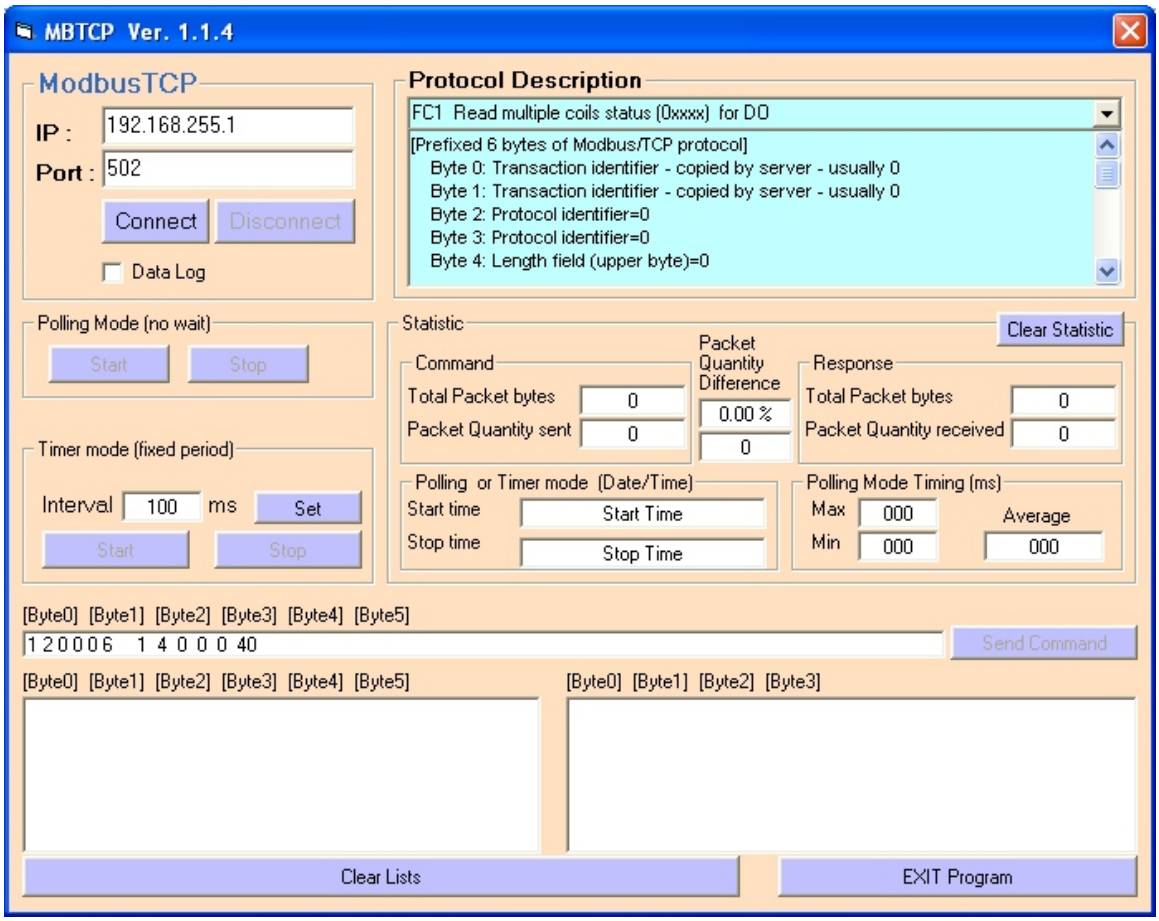




5.3 MBTCP Tool

MBTCP: Modbus/TCP client (with source code in VB6) to diagnostic Modbus/TCP slave devices. After installing the I-7243D Utility tool, users can get it from the following location.





6. Specific Data Formats

By using Modbus/TCP command that contain specific data formats packed in the “Force Multiple Registers” command, users can operate and monitor the I-7243D. After receiving this specific data format command, the I-7243D will unscramble it and perform the relative procedure. The format of this data type is displayed in the following table.

Prefixed 6 bytes of Modbus/TCP protocol:

00	Transaction identifier	1 Byte	Usually 0x00
01	Transaction identifier	1 Byte	Usually 0x00
02	Protocol identifier	1 Byte	0x00
03	Protocol identifier	1 Byte	0x00
04	Length field(upper byte)	1 Byte	Number of bytes following
05	Length field(lower byte)	1 Byte	Number of bytes following

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Byte	Dep. On Data
06	Byte Count (B=2*Word Count)	1 Byte	Dep. On Data
07~(B+6)	**Specific Data Format**	Dep. On Data	Dep. On Data

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Byte	Dep. On Data

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

The following table displays the specific data formats that are supported by I-7243D.

Leading byte	Description	Section
@ (0x40)	DNM_Reset	6.1.1
	DNM_SetMasterMACID	6.1.2
	DNM_SetBaudRate	6.1.3
	DNM_AddDevice	6.1.4
	DNM_RemoveDevice	6.1.5
	DNM_RemoveIOConnection	6.1.6
	DNM_ConfigBitStrobe	6.1.7
	DNM_ConfigPoll	6.1.8
	DNM_ConfigCOS	6.1.9
	DNM_ConfigCyclic	6.1.10
	DNM_StartDevice	6.1.11
	DNM_StopDevice	6.1.12
	DNM_StartAllDevice	6.1.13
	DNM_StopAllDevice	6.1.14
	DNM_ClearAllConfig	6.1.15
	DNM_UpdateBitStrobeConfig	6.1.16
	DNM_UpdatePollConfig	6.1.17
	DNM_UpdateCOSConfig	6.1.18
	DNM_UpdateCyclicConfig	6.1.19
$ (0x24)	Set_Input_Data_Area	6.2.1
	Set_Output_Data_Area	6.2.2
	Clear_All_Input_Data_Area_Setting	6.2.3
	Clear_All_Output_Data_Area_Setting	6.2.4

6.1 Commands For Configuring DeviceNet Devices

The leading byte of the commands for configuring DeviceNet devices is the char '@', 0x40h. After receiving the command of this specific data format, the I-7243D will unscramble it and perform the relative procedure. These commands for configuring DeviceNet devices are described in the following sub-section.

6.1.1 DNM_Reset

This command is used to reset the system of the I-7243D

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '@'	1 Byte	0x40
08	Reset Command	1 Byte	**0x2F**

Response:

No Response. After receiving this command, the I-7243d will reset the system and disconnect with all other clients.

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.2 DNM_SetMasterMACID

The command is used for users to set the DeviceNet MACID of the I-7243D. After resetting the system of the I-7243D, the configuration of MACID will take affect.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x02
06	Byte Count (B=2*Word Count)	1 Byte	0x04
07	Leading byte = '@'	1 Byte	0x40
08	Set MACID Command	1 Byte	**0x02**
09	Separating byte = '!'	1 Byte	0x21
10	MAC ID	1 Byte	0x00~0x3F

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x02

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.3 DNM_SetBaudRate

The command is used for users to set the DeviceNet baud-rate of the I-7243D. After resetting the system of the I-7243D, the configuration of baud-rate will take affect.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x02
06	Byte Count (B=2*Word Count)	1 Byte	0x04
07	Leading byte = '@'	1 Byte	0x40
08	Set baud-rate Command	1 Byte	**0x03**
09	Separating byte = '!'	1 Byte	0x21
10	Baud-rate of DeviceNet	1 Byte	0x00: 125K 0x01: 250K 0x02: 500K

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x02

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.4 DNM_AddDevice

The command is used for users to add a DeviceNet device into the I-7243D's scan-list table. This command is used to add device, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x03
06	Byte Count (B=2*Word Count)	1 Byte	0x06
07	Leading byte = '@'	1 Byte	0x40
08	Add Device Command	1 Byte	**0x04**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	EPR of Explicit connection (high byte)	1 Byte	0x00~0xFF
12	EPR of Explicit connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x03

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.5 DNM_RemoveDevice

The command is used for users to remove a DeviceNet device from the I-7243D's scan-list table. After removing the device, the I-7243D will stop communicating with it. And all the connections between them will be released.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x02
06	Byte Count (B=2*Word Count)	1 Byte	0x04
07	Leading byte = '@'	1 Byte	0x40
08	Remove Device Command	1 Byte	**0x05**
19	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x02

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.6 DNM_RemoveIOConnection

The command is used for user to remove a connected IO connection between the DeviceNet device and I-7243D. After using the command to remove the connection, the connection will be released by the I-7243D. And the configuration of this connection will be erased from the scan-list table of I-7243D.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x03
06	Byte Count (B=2*Word Count)	1 Byte	0x06
07	Leading byte = '@'	1 Byte	0x40
08	Remove IO Connection Command	1 Byte	**0x06**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Connection Type	1 Byte	0x00: Explicit 0x01: Poll 0x02: Bit-Strobe 0x03: COS 0x04: Cyclic
12	End Char = CR (0x0D)	1 Byte	0x0D

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x03

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.7 DNM_ConfigBitStrobe

The command is used for users to configure the Bit-Strobe IO connection between the DeviceNet device and the I-7243D. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x04
06	Byte Count (B=2*Word Count)	1 Byte	0x08
07	Leading byte = '@'	1 Byte	0x40
08	Configure Bit-Strobe Command	1 Byte	**0x07**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	EPR of Bit-Strobe connection (high byte)	1 Byte	0x00~0xFF
14	EPR of Bit-Strobe connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x04

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.8 DNM_ConfigPoll

The command is used for users to configure the Poll IO connection between the DeviceNet device and the I-7243D. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Configure Poll Command	1 Byte	**0x08**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of Poll connection (high byte)	1 Byte	0x00~0xFF
16	EPR of Poll connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.9 DNM_ConfigCOS

The command is used for users to configure the COS IO connection between the DeviceNet device and the I-7243D. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Configure COS Command	1 Byte	**0x09**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of COS connection (high byte)	1 Byte	0x00~0xFF
16	EPR of COS connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.10 DNM_ConfigCyclic

The command is used for user to configure the Cyclic IO connection between the DeviceNet device and the I-7243D. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Configure Cyclic Command	1 Byte	**0x0A**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of Cyclic connection (high byte)	1 Byte	0x00~0xFF
16	EPR of Cyclic connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.11 DNM_StartDevice

After configuring the IO connection of each device, users can use this command to let the I-7243D start to communicate with each DeviceNet device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x02
06	Byte Count (B=2*Word Count)	1 Byte	0x04
07	Leading byte = '@'	1 Byte	0x40
08	Start Device Command	1 Byte	**0x0B**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x02

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.12 DNM_StopDevice

Users can use this command to release the connection between I-7243D and device. The configuration of this connection still is saved in the scan-list table of I-7243D.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x02
06	Byte Count (B=2*Word Count)	1 Byte	0x04
07	Leading byte = '@'	1 Byte	0x40
08	Stop Device Command	1 Byte	**0x0C**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x02

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.13 DNM_StartAllDevice

After configuring the IO connection of each device, users can use this command to let the I-7243D start to communicate with all DeviceNet devices.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '@'	1 Byte	0x40
08	Start All Device Command	1 Byte	**0x0D**

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x01

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.14 DNM_StopAllDevice

Users can use this command to release the connections between I-7243D and all DeviceNet devices. These configurations of these connections still are saved in the scan-list table of I-7243D.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '@'	1 Byte	0x40
08	Start All Device Command	1 Byte	**0x0E**

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x01

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.15 DNM_ClearAllConfig

Users can use this command to clear all the configurations of devices, in the I-7243D's scan-list table. After receiving this command by the I-7243D, it will release all connection between the devices, and clear all configurations of the DeviceNet devices.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '@'	1 Byte	0x40
08	Start All Device Command	1 Byte	**0x49**

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x01

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.16 DNM_UpdateBitStrobeConfig

After configuring the Bit-Strobe IO connection, user can update the parameters of this connection by using this command. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x04
06	Byte Count (B=2*Word Count)	1 Byte	0x08
07	Leading byte = '@'	1 Byte	0x40
08	Update Bit-Strobe Command	1 Byte	**0x26**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	EPR of Bit-Strobe connection (high byte)	1 Byte	0x00~0xFF
14	EPR of Bit-Strobe connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x04

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.17 DNM_UpdatePollConfig

After configuring the Poll IO connection, user can update the parameters of this connection by using this command. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Update Poll Command	1 Byte	**0x27**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of Poll connection (high byte)	1 Byte	0x00~0xFF
16	EPR of Poll connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.18 DNM_UpdateCOSConfig

After configuring the COS IO connection, user can update the parameters of this connection by using this command. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Update COS Command	1 Byte	**0x28**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of COS connection (high byte)	1 Byte	0x00~0xFF
16	EPR of COS connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.1.19 DNM_UpdateCyclicConfig

After configuring the Cyclic IO connection, user can update the parameters of this connection by using this command. This command is used to configure the IO connection, but not start to communicate with the device.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	0x00 0x05
06	Byte Count (B=2*Word Count)	1 Byte	0x0A
07	Leading byte = '@'	1 Byte	0x40
08	Update Cyclic Command	1 Byte	**0x29**
09	Separating byte = '!'	1 Byte	0x21
10	Device MACID	1 Byte	0x00~0x3F
11	Input data length of device (high byte)	1 Byte	Dep. on input data length of device
12	Input data length of device (low byte)	1 Byte	Dep. on input data length of device
13	output data length of device (high byte)	1 Byte	Dep. on output data length of device
14	output data length of device (low byte)	1 Byte	Dep. on output data length of device
15	EPR of Cyclic connection (high byte)	1 Byte	0x00~0xFF
16	EPR of Cyclic connection (low byte)	1 Byte	0x00~0xFF

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	0x01 0x00
04~05	Word Count	2 Bytes	0x00 0x05

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.2 Commands For Configuring Input/Output Data Area

The leading byte of the commands for configuring I/O Data Area is the char '$', 0x24h. After receiving the command of this specific data format, the I-7243D will unscramble it and perform the relative procedure. These commands for configuring DeviceNet devices are described in the following sub-section.

6.2.1 Set_Input_Data_Area

Users can use this command to allocate the data of DeviceNet input devices into certain address of Input Data Area. Before using this command, users must know what's IO connection of the input device already been established. The structure of this command is shown below.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00** **(Command Area)**
04~05	Word Count	2 Bytes	Dep. on device Num.
06	Byte Count (B=2*Word Count)	1 Byte	Dep. on device Num
07	Leading byte = '$'	1 Byte	0x24
08	Configure Input Area Command	1 Byte	**0x00**
09	Fragment Byte = This command is fragment or not	1 Byte	0x00: nun-fragment 0x01: fragment
10	Device Count of this command, 29 devices at maximum	1 Byte	0x01~0x1D
11~12	Device1, Start address of Input Data Area	2 Bytes	0x0000~0x01FF
13~14	Device1, Input data length	2 Bytes	0x0000~0x0200
15	Device1, MACID	1 Byte	0x00~0x3F
16	Device1, Connection Type	1 Byte	0x00: Explicit 0x01: Poll 0x02: Bit-Strobe 0x03: COS 0x04: Cyclic
17	Device1, Data Type	1 Byte	0x00: Input

18	End Char = CR (0x0D)	1 Byte	0x0D
19~26	Device 2 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)
27~34	Device 3 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)
: :	: :	: :	: :
235~243	Device 29 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	Dep. on request command Length
04~05	Word Count	2 Bytes	Dep. on request command Length

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

Note:

1. If the device number that you want to set is more than 29, then the sending number of this command is more than one time.
   First command: fragment byte = 0x00.
   The other command: fragment byte = 0x01.
   The I-7243D will set all the data in the Input Data Area to 0x00 after receiving the Set_Input_Data_Area, fragment byte = 0x00, command.

2. The parameter of these parameters must be suitable with the connection attribute values of the input device. Otherwise, the data of input device will not be stored into the Input Data Area.

3. After mapping the device data into the Input Data Area, all the parameters will be stored into the Input Status Area address, 0300h~061Fh, table 4-7, and EEPROM of I-7243D.

6.2.2 Set_Output_Data_Area

Users can use this command to allocate certain address of Output Data Area for the data of DeviceNet output devices. Before using this command, users must know what's IO connection of the output device already been established. The structure of this command is shown below.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Bytes	Dep. on device Num.
06	Byte Count (B=2*Word Count)	1 Byte	Dep. on device Num
07	Leading byte = '$'	1 Byte	0x24
08	Configure Output Area Command	1 Byte	**0x01**
09	Fragment Byte = This command is fragment or not	1 Byte	0x00: nun-fragment 0x01: fragment
10	Device Count of this command, 29 devices at maximum	1 Byte	0x01~0x1D
11~12	Device1, Start address of Output Data Area	2 Bytes	0x0000~0x01FF
13~14	Device1, Output data length	2 Bytes	0x0000~0x0200
15	Device1, MACID	1 Byte	0x00~0x3F
16	Device1, Connection Type	1 Byte	0x00: Explicit 0x01: Poll 0x02: Bit-Strobe 0x03: COS 0x04: Cyclic
17	Device1, Data Type	1 Byte	0x01: Output
18	End Char = CR (0x0D)	1 Byte	0x0D
19~26	Device 2 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)
27~34	Device 3 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)
: :	: :	: :	: :
235~243	Device 29 (Same as byte 11 ~ 18)	8 Bytes	(Same as byte 11 ~ 18)

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Bytes	Dep. on request command Length
04~05	Word Count	2 Bytes	Dep. on request command Length

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

Note:

1. If the device number that you want to set is more than 29, then the sending number of this command is more than one time.
   First command: fragment byte = 0x00.
   The other command: fragment byte = 0x01.
   The I-7243D will set all the data in the Output Data Area to 0x00 after receiving the Set_Output_Data_Area, fragment byte = 0x00, command.

2. The parameters of the configuration must be suitable with the connection attribute values of the output device. Otherwise, the data in the Output Data Area will not be sent to the output device.

3. After mapping the device data into the Output Data Area, all the parameters will be stored into the Output Status Area address, 0300h~061Fh, table 4-6, and EEPROM of I-7243D.

6.2.3 Clear_All_Input_Data_Area

Users can use this command to clear all the data in the Input Data Area of the I-7243D. After receiving this command by the I-7243D, it will set the flag, Total Number of Input commands, table 4-7, and all data in the Input Data Area to zero.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Byte	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '$'	1 Byte	0x24
08	Clear all data in the Input Data Area	1 Byte	**0x02**

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	0x01 0x00
04~05	Word Count	2 Byte	0x00 0x01

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.2.4 Clear_All_Output_Data_Area

Users can use this command to clear all the data in the Output Data Area of the I-7243D. After receiving this command by the I-7243D, it will set the flag, Total Number of output commands, table 4-6, and all data in the Output Data Area to zero.

Request:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	**0x01 0x00 (Command Area)**
04~05	Word Count	2 Byte	0x00 0x01
06	Byte Count (B=2*Word Count)	1 Byte	0x02
07	Leading byte = '$'	1 Byte	0x24
08	Clear all data in the Output Data Area	1 Byte	**0x03**

Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x10
02~03	Reference Number	2 Byte	0x01 0x00
04~05	Word Count	2 Byte	0x00 0x01

Error Response:

00	Net ID (Station Number)	1 Byte	Module Net ID
01	Function Code	1 Byte	0x90
02	Exception Code	1 Byte	Refer to table 4-2 for more details.

6.3 The Communicated Flow Diagram

The following flow diagram mainly presents how to configure the I-7243D by the specific Modbus/TCP commands. To configure the module, users just need to send the specific commands step by step or configure it by the Utility tool. For more information, please refer to the command description, in section 6.1 and 6.2, and operating steps of the Utility tool, in section 5.1.

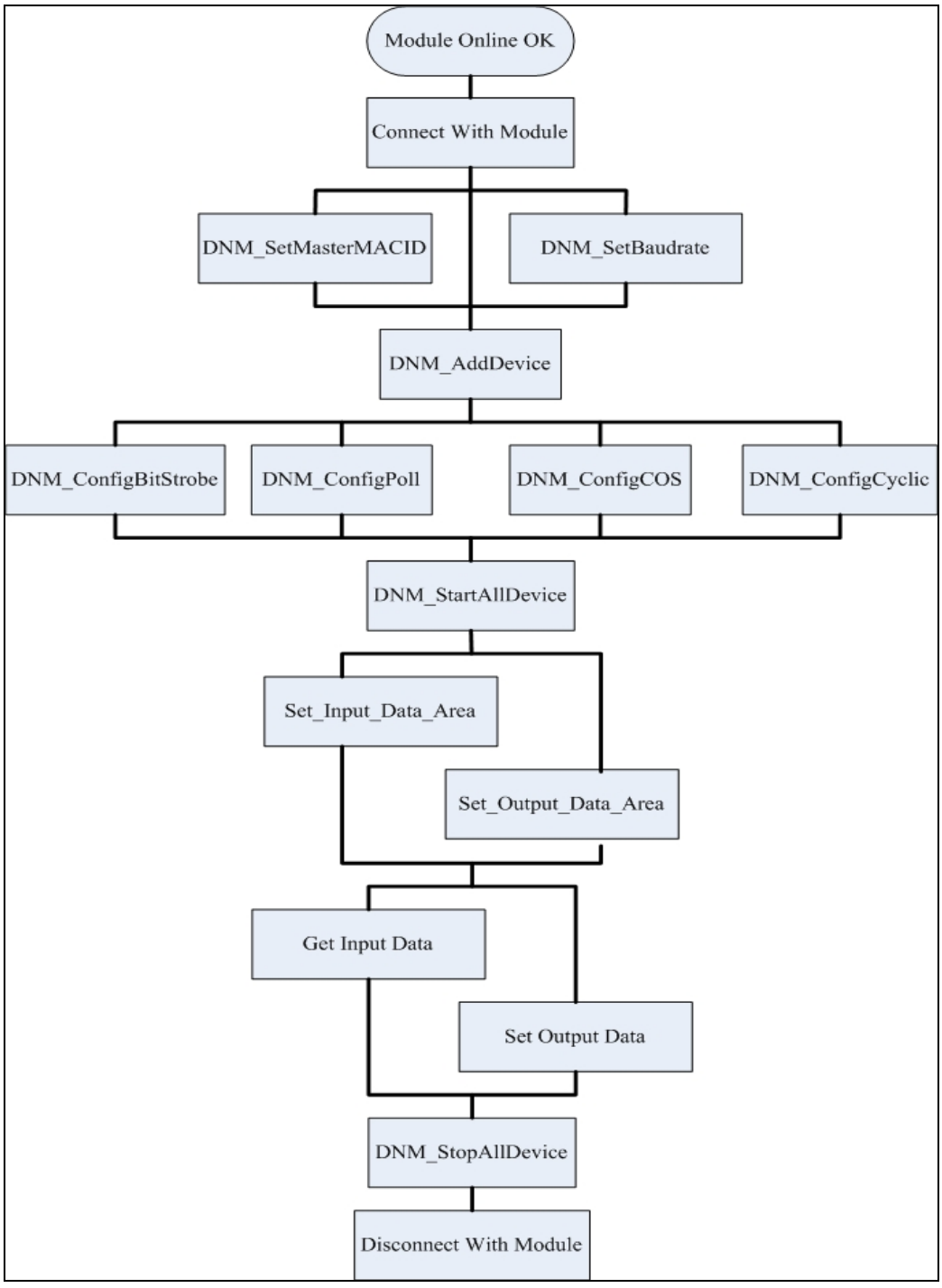


Figure 6-1: Flow diagram of configuring steps

7. VxComm Applications

- Overview
- Installing the VxComm Driver
- Adding a I-7243D and configuring the VxComm Driver
- Removing a I-7243D
- Uninstalling the VxComm Driver

7.1 Overview

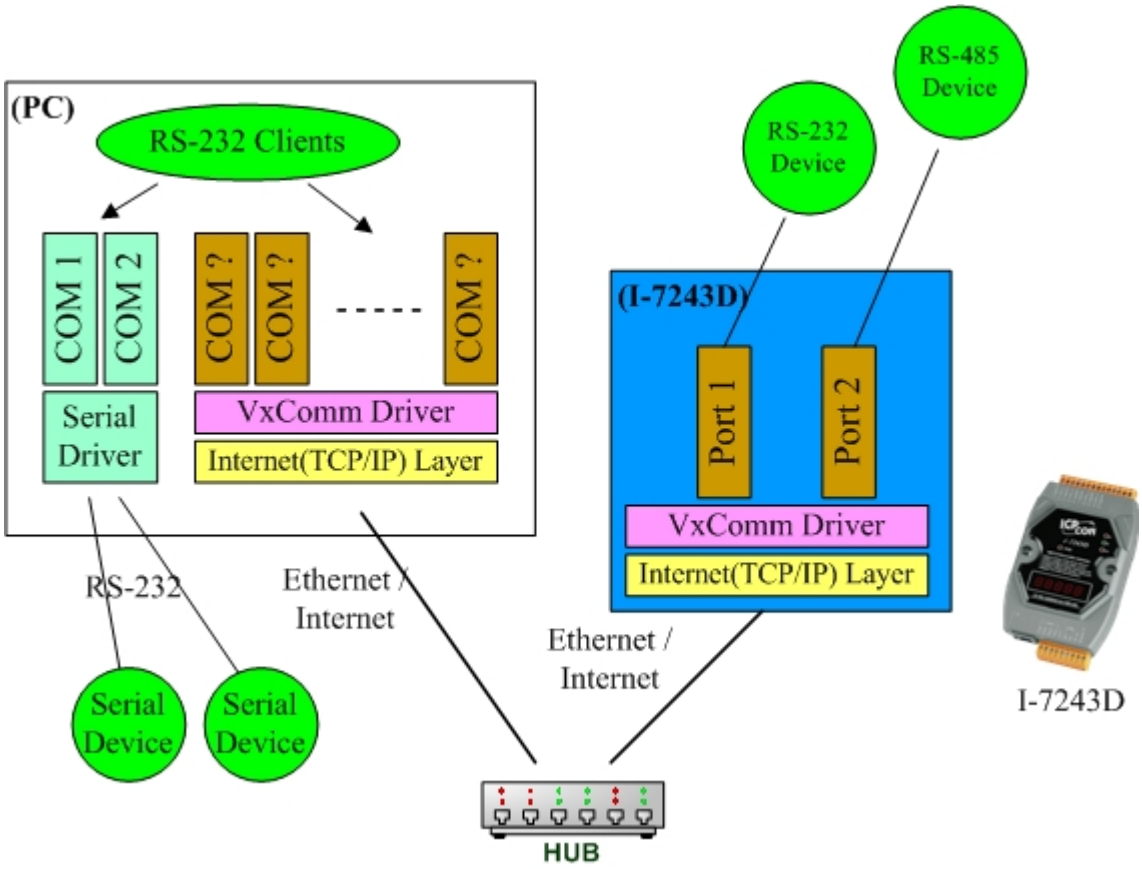
The VxComm (Virtual Comm) Driver and VxComm Utility are very easy to install and use. The first thing to do is to find the installation file in the included CD. The directory is:

- 8000CD:\\Napdos\7188e\Tcp\VxComm\driver(pc)\NT\VxCommNT.exe
  (for Windows NT 4.0) or
- 8000CD:\\Napdos\7188e\Tcp\VxComm\driver(pc)2K\VxComm2K.exe
  (for Windows 2000, Windows XP).

This document shows how to install and configure the driver correctly. The first part instructs users how to install the software. The second part shows how to add an I-7243D server and configure a COM port. Finally, the third part teaches you how to remove an I-7243D server.

7.1.1 Architecture

The VxComm Driver creates COM port(s) and maps them to the COM port(s) of the I-7243D. The user's RS-232 client programs need only to change to the different COM port to access the serial devices that are allocated to the Internet or Ethernet network via the I-7243D.



7.1.2 Ports mapping

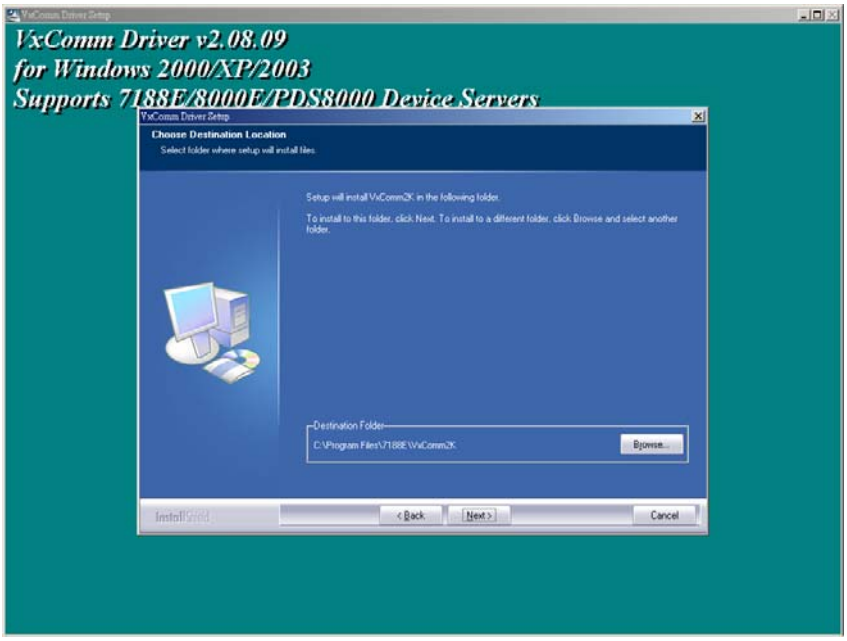
Vxcomm Driver/Utility supports Port 1 to Port 2 in accessing COM1 to COM2 of the I-7243D. Another Port I/O is designed to access the I/O boards mounted on I-7243D, but it doesn't use now. With the help of the VxComm Driver/Utility, uses can map remote COM port to become a virtual COM port of PC. One PC can control maximum number of 256 COM ports (including COM1 and COM2).

Local COM Port (PC)	VxComm Driver/Utility (PC)	Remote COM port (I-7243D)
COM ?	Port 1	COM1
COM ?	Port 2	COM2
COM ?	Port I/O	Reserved

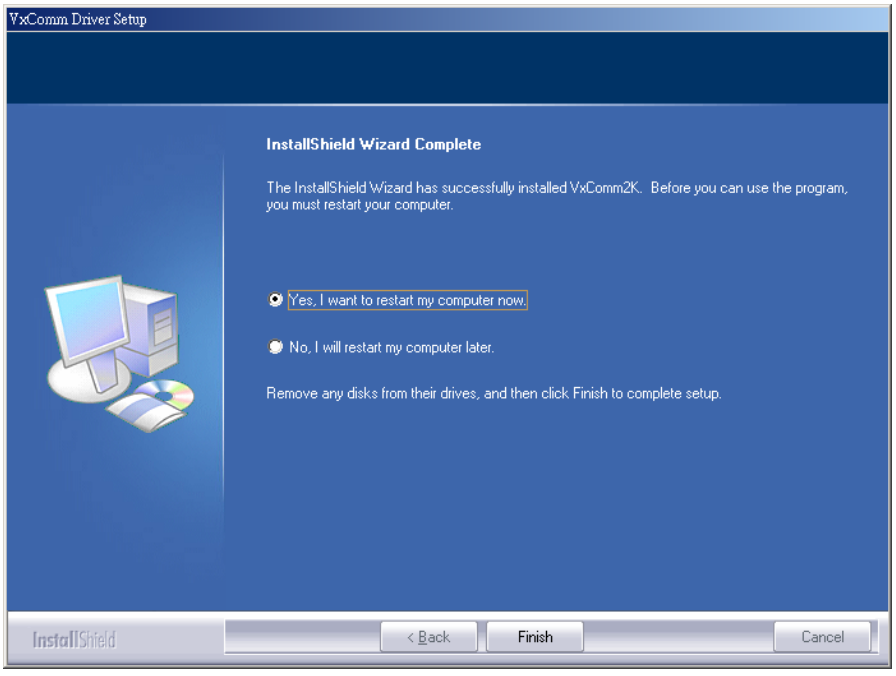
7.2 Installing the VxComm Driver

Step 1: Run VxComm2K.exe (for Windows 2000, Windows XP) or VxCommNT.exe (WindowsNT 4.0) in the packaged CD to start installing.

Step 2: Choose a destination folder.


VxComm Driver v2.08.09
for Windows 2000/XP/2003
Supports 7188E/8000E/PDS8000 Device Servers
VxComm Driver Setup
Choose Destination Location
Select folder where setup will install files.
Setup will install VxComm2K in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\7188E\VxComm2K
Browse...
InstallShield
< Back
Next >
Cancel

Step 3: Select the "Yes, ... " option and click the "Finish" button to reboot your computer.

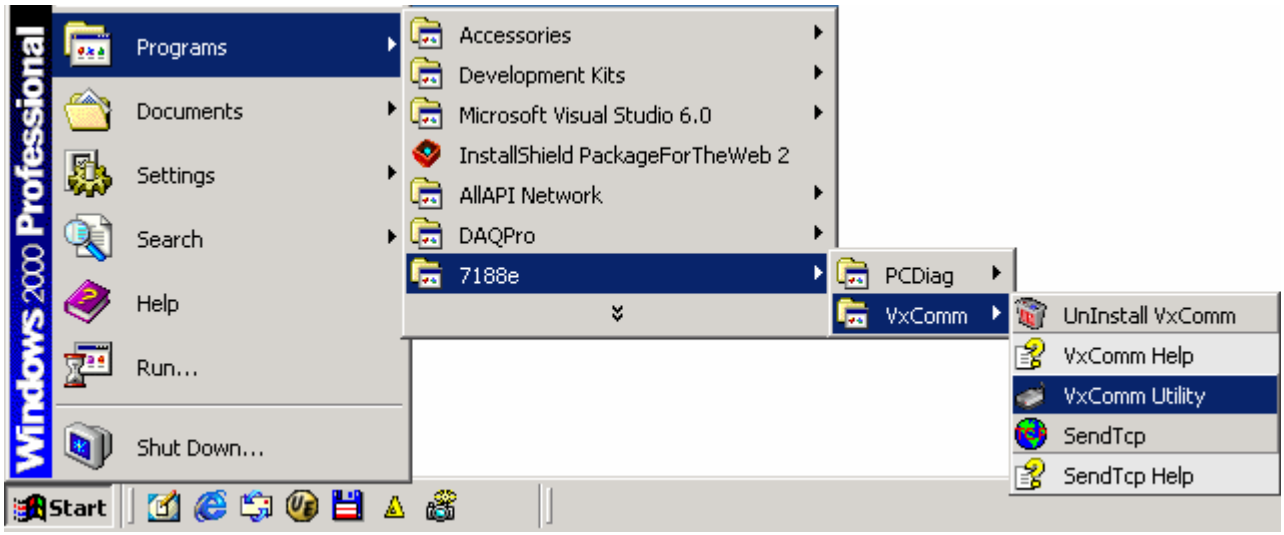

VxComm Driver Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed VxComm2K. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
InstallShield
< Back
Finish
Cancel

Step 4: After rebooting the computer, the VxComm Utility will ask you to configure the virtual COM port(s). Please refer to the next section for more information.

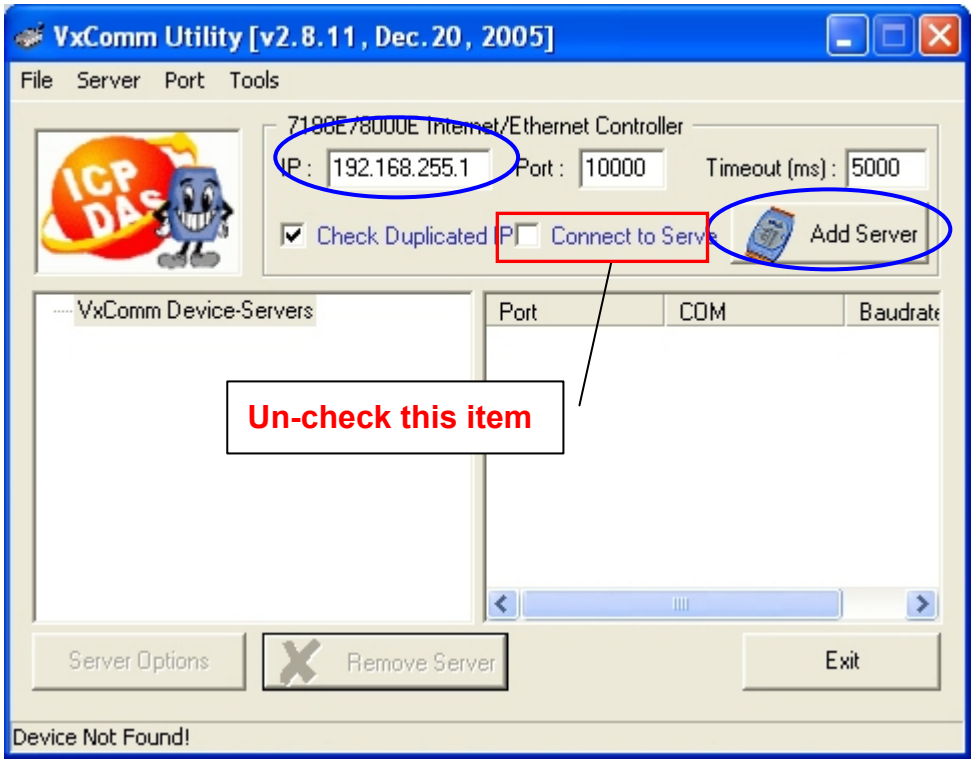
7.3 Adding an I-7243D and configuring the VxComm Driver

I-7243D's default IP address is 192.168.255.1.

Step 1: Select the "VxComm Utility".



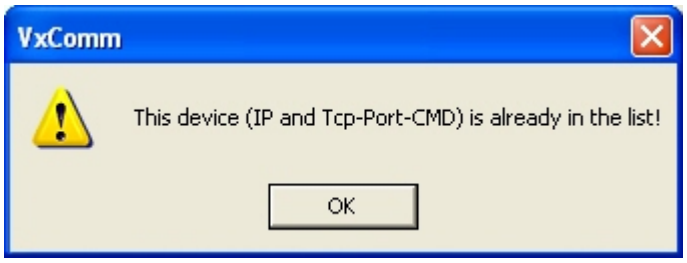
Step 2: Add an I-7243DD server IP address and Press the "Add Server" Button.



Note:

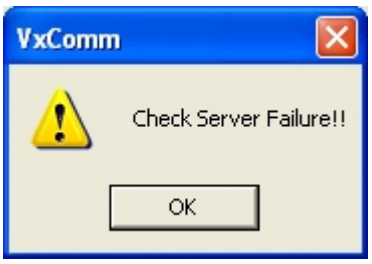
"Check Duplicate" option:

Checks whether the IP address is already listed in the server window (left-hand window). Default is automatically checked. The following window pops up if IP address is duplicated.

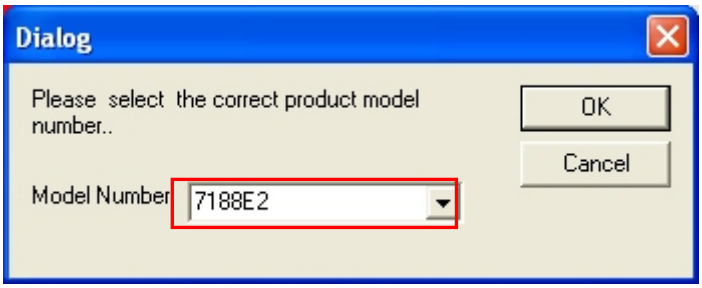


"Check Server" option:

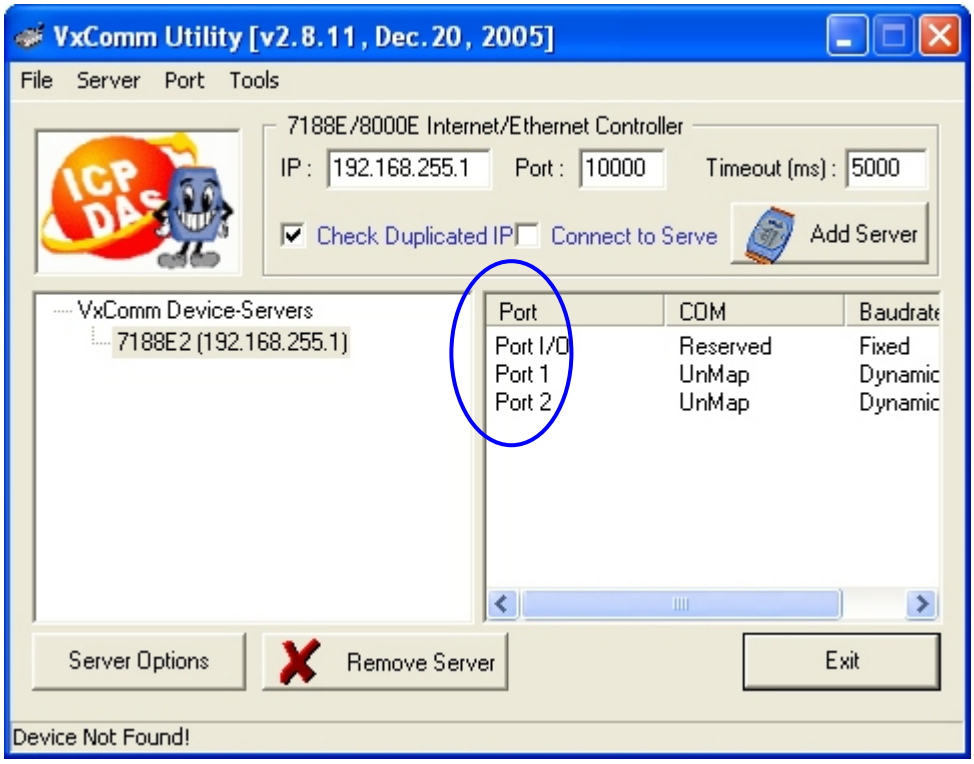
Connects to the I-7243D and gets the device's name before adding to the server window (left-hand window). Default is automatically checked. The following window pops up if the host fails to connect.



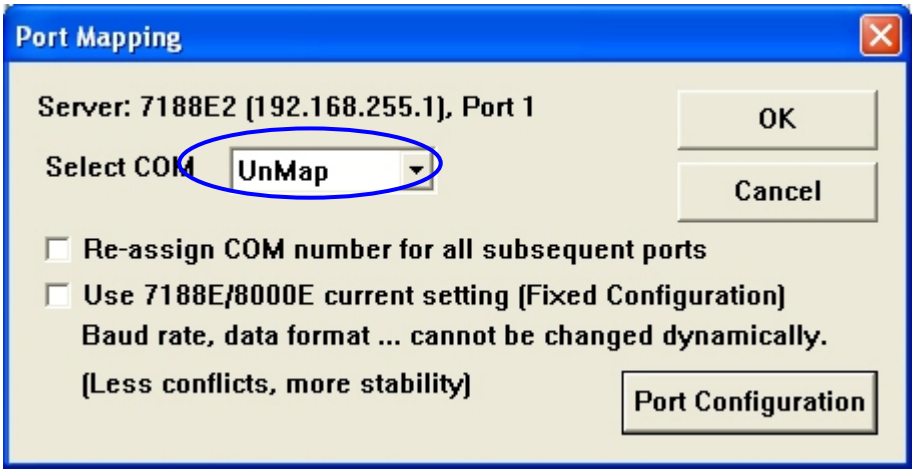
Step 3: Then a “Dialog” window will be popped up. Then select the module Number: “7188E2” to add the I-7243D module into the server window.



Step 4: And then it will display the name of “7188E2” and it’s IP on the server window. Select one of the I-7243D devices and configure the virtual COM port(s) by double clicking "Port1", "Port2" or etc.



Step 5: Double click an appropriate COM port number, and then it will pop up a “Port Mapping” window. Then select the virtual COM port of PC on the “Select COM” dialogue.



Note:

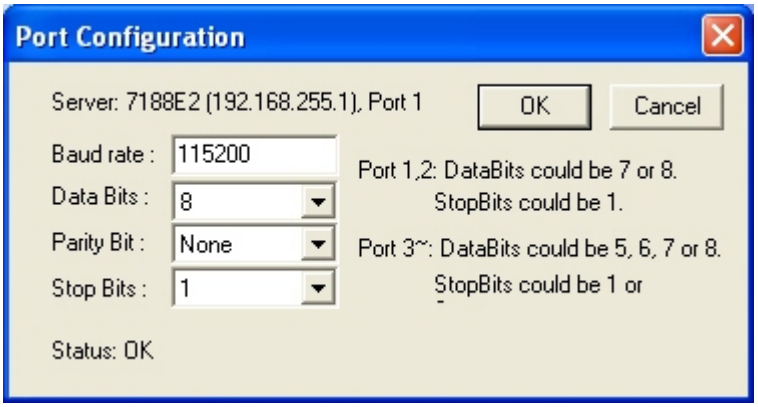
"Re-Assign COM number for all subsequent ports" option:

This option will assign the following ports with the available COM port number sequentially and automatically.

For example: If Port1 = COM4, then Port2 = COM5, Port3 = COM6

"Use 7188E/8000E current setting (Fixed Configuration)" option:

You can click the "Port Configuration" button to configure this port's Baud rate and Data format settings. After the configuration, you can then check this option.



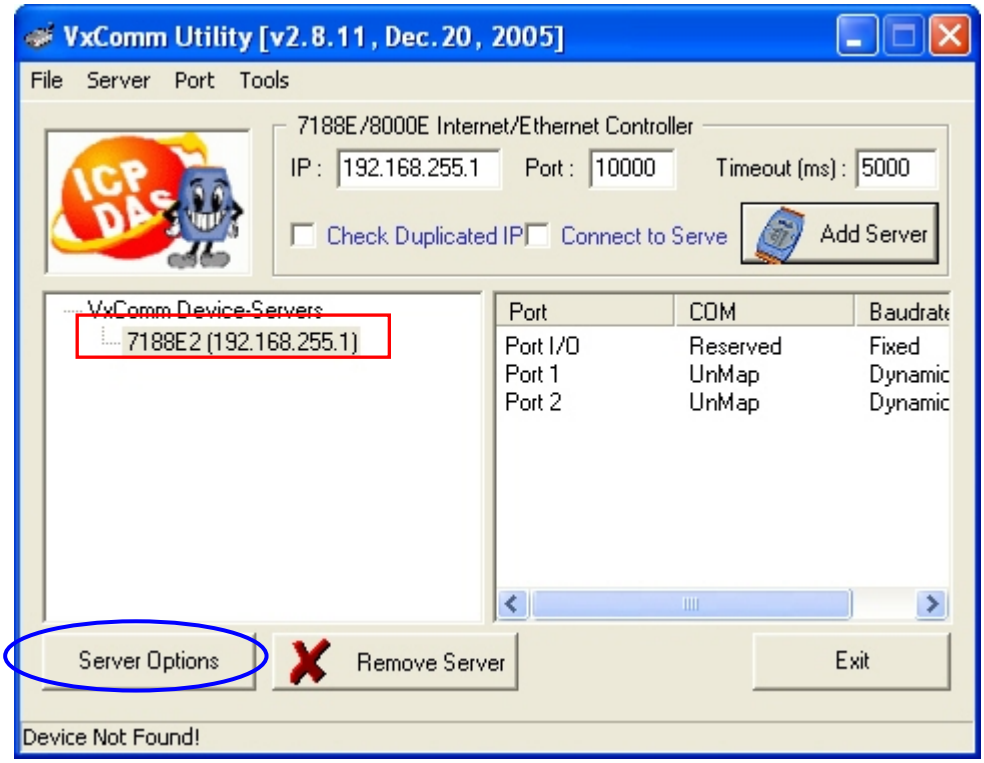
Fixed Configuration (Use 7243D's current setting):

By using this feature, the VxComm Driver would not change the I-7243D's Com port settings dynamically. This is proper when you have multi-clients to access the same I-7243D server.

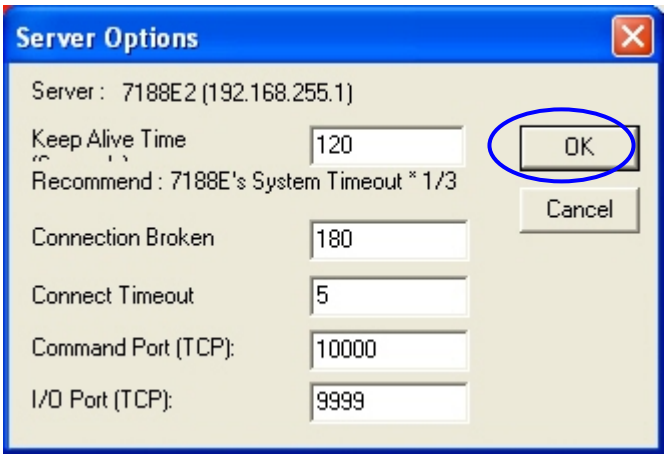
Dynamic Configuration (It's the default method):

The VxComm Driver always change the I-7243D's settings dynamically. It is proper for working with several different baud rate and data format.

Step 6: Select one of the 7188E/8000E devices and then click the "Server Options" button to configure the options.



Step 7: Key in the value and then click the "OK" button to exit.



Notes:

Keep Alive Time (s) field:

After connecting to the I-7243D, the VxComm Driver will automatically and periodically sends commands to keep the I-7243D alive. The timer will be reset after each sending command or receiving data success. The Keep-Alive mechanism won't work until the next timeout.

The default setting of Keep-Alive time is about 7 second. It's recommended setting is (I-7243D's System Timeout * 1 / 3) or a smaller value.

Connection-Broken (s) field:

The VxComm Driver will try to build a new connection when the connection is broken. When clients send a message to the I-7243D, the Internet (TCP/IP) layer may respond with a "Disconnect" event to the VxComm Driver if it sends the message failure in 20 seconds or later. Users can set a shorter Connection-Broken timeout [for example: 10 seconds)] to force the VxComm Driver to build the connection again and get a quicker response.

If there is no sending/receiving signal in the connection during the Connection-Broken time, the connection will be marked as broken. The VxComm Driver will build the connection again in Connection-Broken time. Thus, the Keep-Alive Time should be shorter than the Connection-Broken time to make the connection come on-line.

The default System Timeout (/STxxx) value of the I-7243D is about 300 seconds. After client programs connect to the I-7243D, the clients must send commands to keep the I-7243D alive before timeout is up, otherwise the I-7243D will reset itself and clients must build the connection again.

You can disable the Keep-Alive Time and the Connection-Broken mechanisms by setting their value to 0.

Connect Timeout (ms) field:

The timeout value will be passed into MS TCP/IP driver for reference when connecting and disconnecting.

Command TCP Port field:

By default setting, the I-7243D use TCP port 10000 as the Command/Configuration port of its COM1 and COM2. If you change it's setting, you must assign the correct one in the field. So the VxComm Driver can connect to the right TCP port.

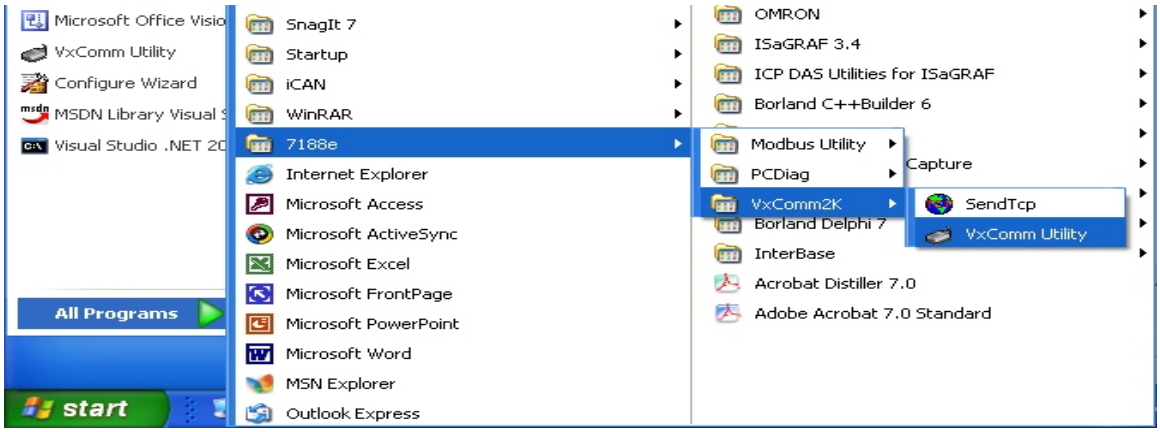
I/O Port field:

By default setting, the I-7243D use TCP port 9999 as the Port7000 port. Now, this TCP port is reserved.

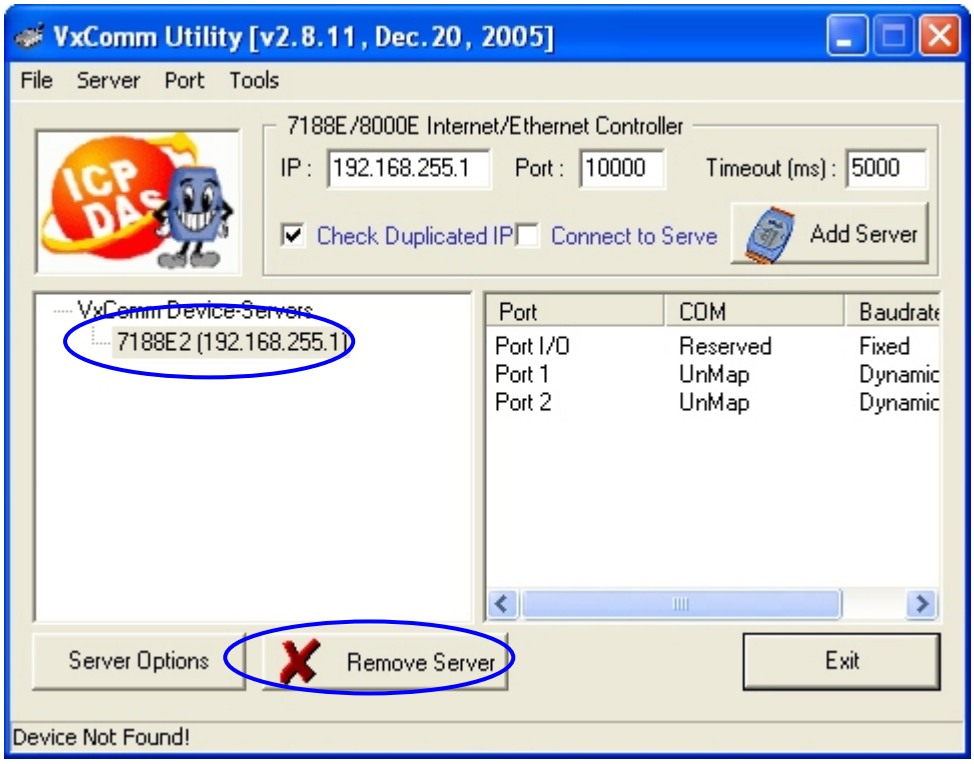
Step 8: Press the "OK" button to save the settings and exit the VxComm Utility.

7.4 Removing an I-7243D

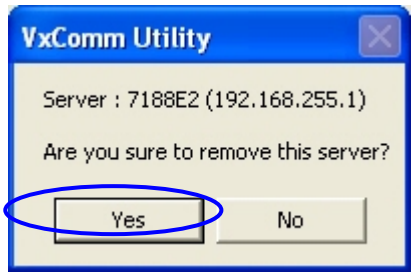
Step 1: Select the "VxComm Utility".



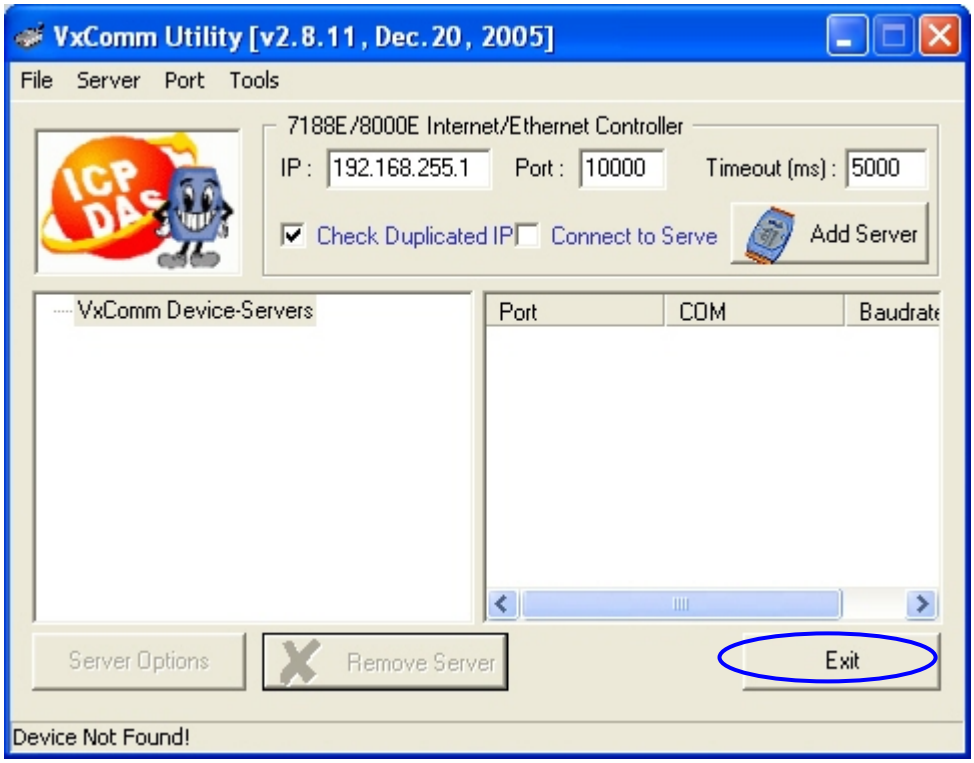
Step 2: Click the server name you want to remove and press the "Remove Server" button.



Step 3: The following window will pop up, please make sure of your choice and press the "Yes" button to remove it.

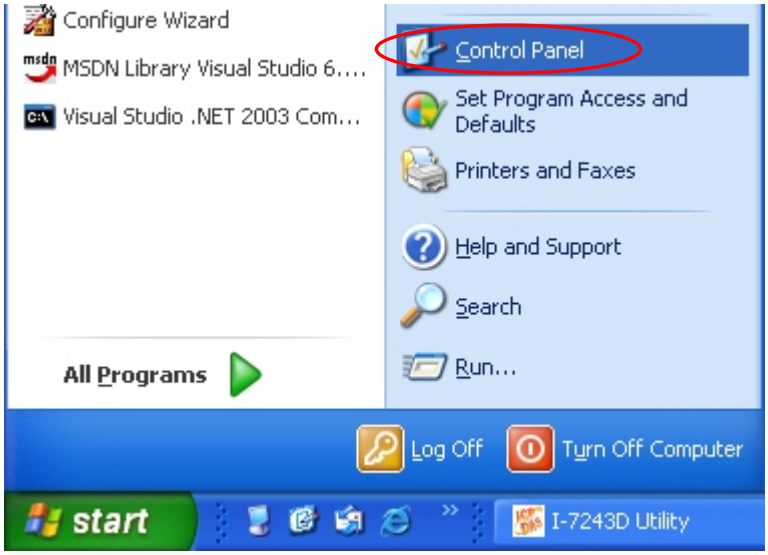


Step 4: Press the "Exit" button to finish this utility.

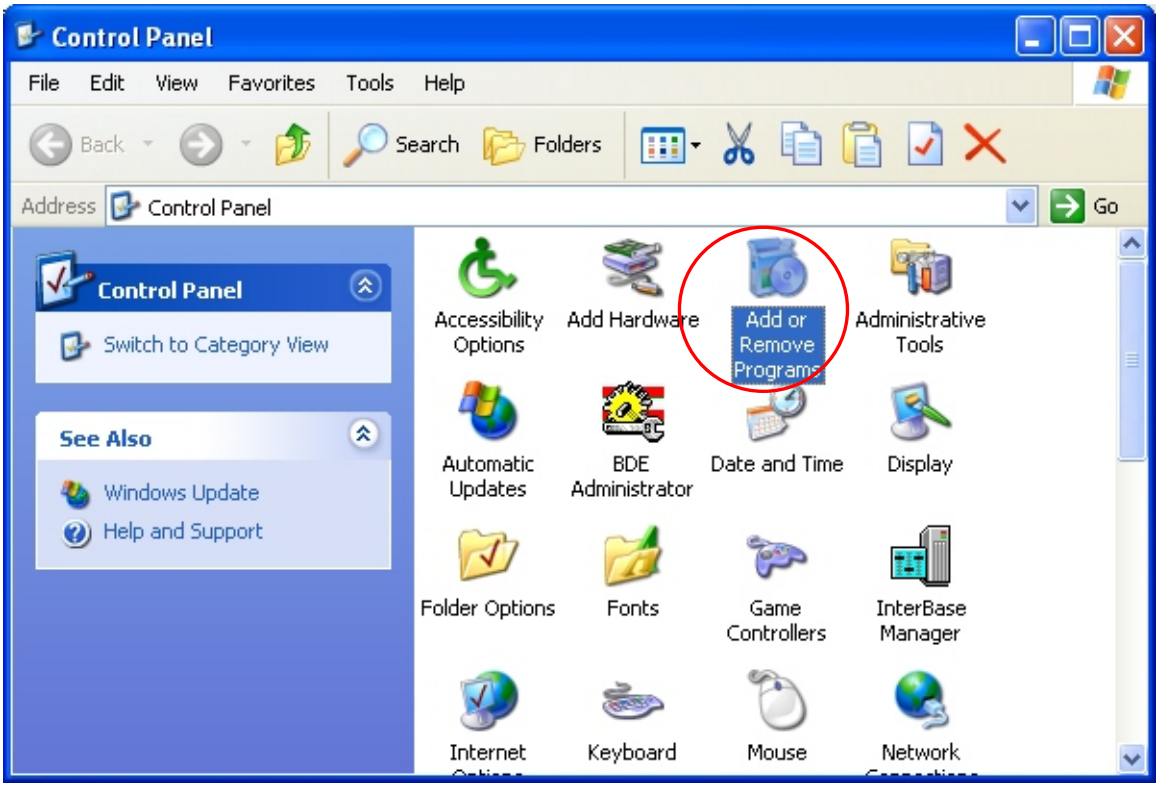


7.5 Uninstalling the VxComm Driver

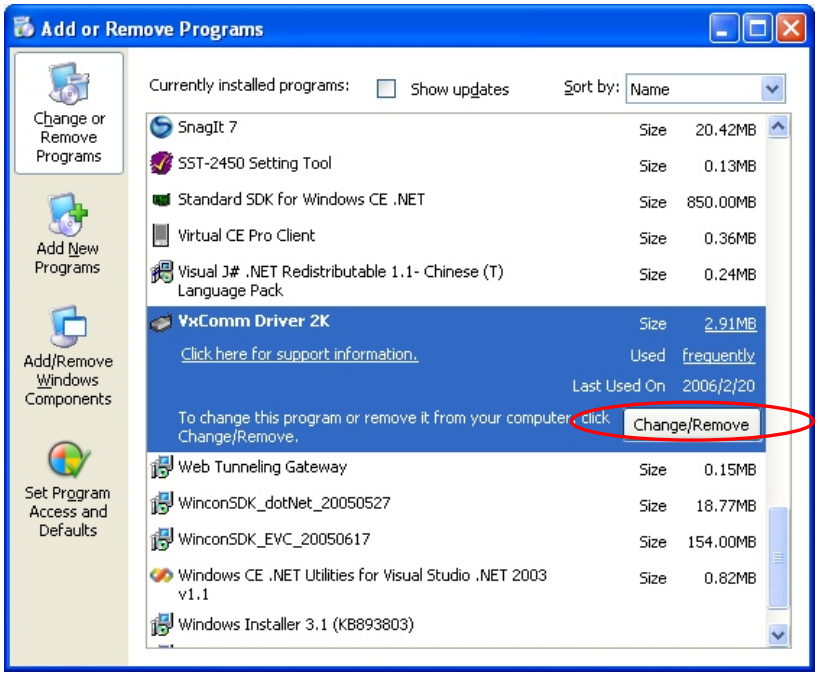
Step 1: Select the "Control Panel".



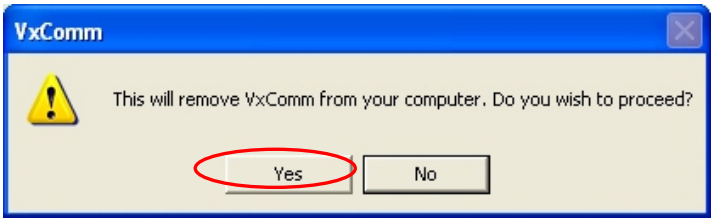
Step 2: Click the "Add or Remove Programs" to open the dialog.



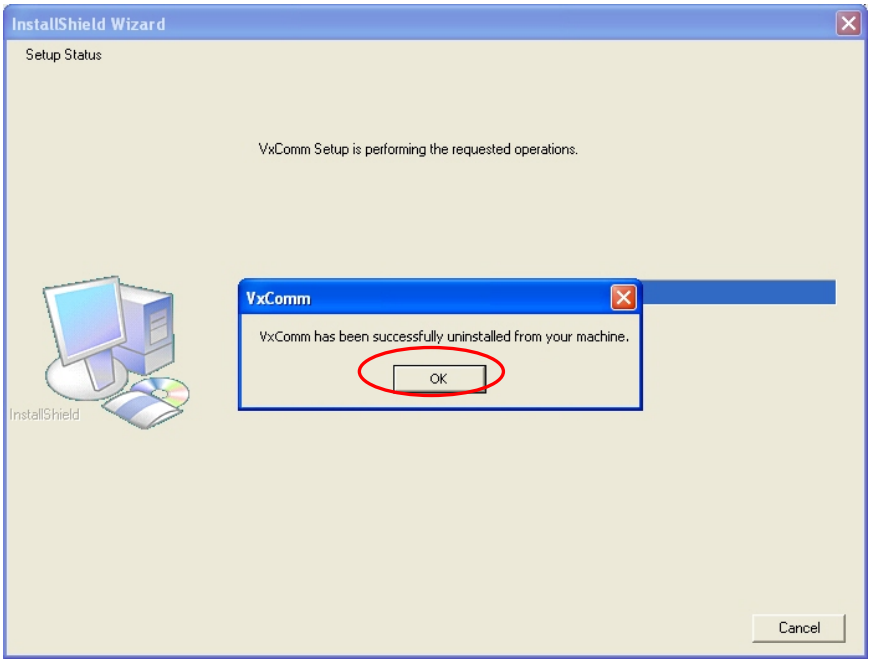
Step 3: Find out the VxComm Driver, and click the “Change/Remove” button.



Step 4: Click the button “Yes” to remove the software.



Step 5: Finally, click the “OK” button to finish the uninstall process.



8. Diagnostics and Troubleshooting

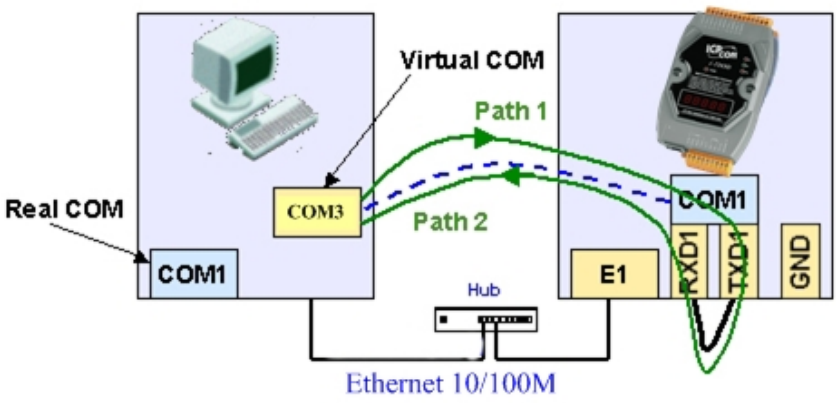
8.1 Diagnostics

After configuring the VxComm Driver by using the VxComm Utility, the VxComm Driver should work without error. However, users can use a simple test to make sure it's working properly.

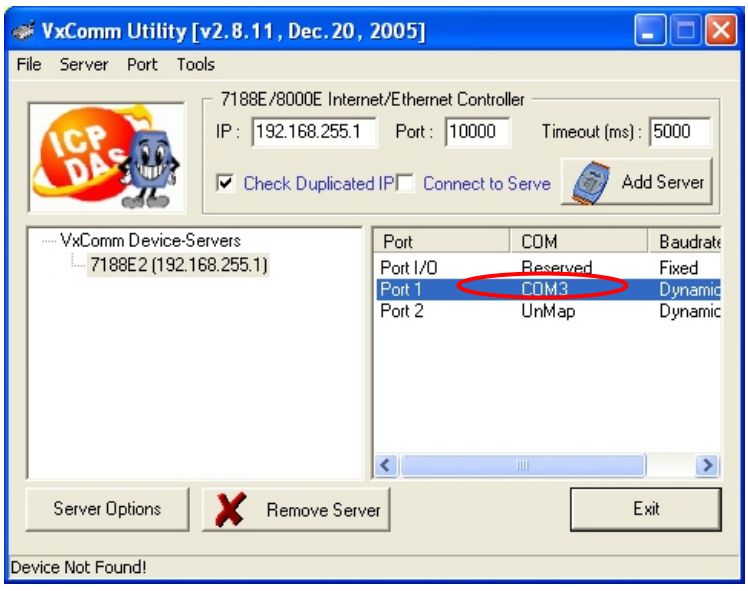
Note: The test method depends on the user's devices and client programs. And users must install the PC-Dialog tool on the CD: 8000CD:\Napdos\7188e\TCP\PCDiag\Setup\Setup.exe

■ Example 1: Loop-Back Testing

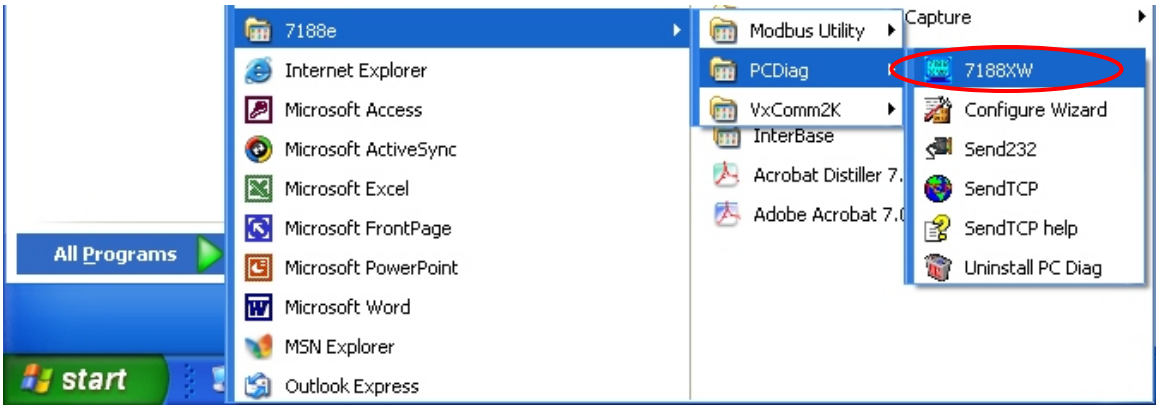
Step 1: Wire the TXD1 with the RXD1 (COM1) of the I-7243D.



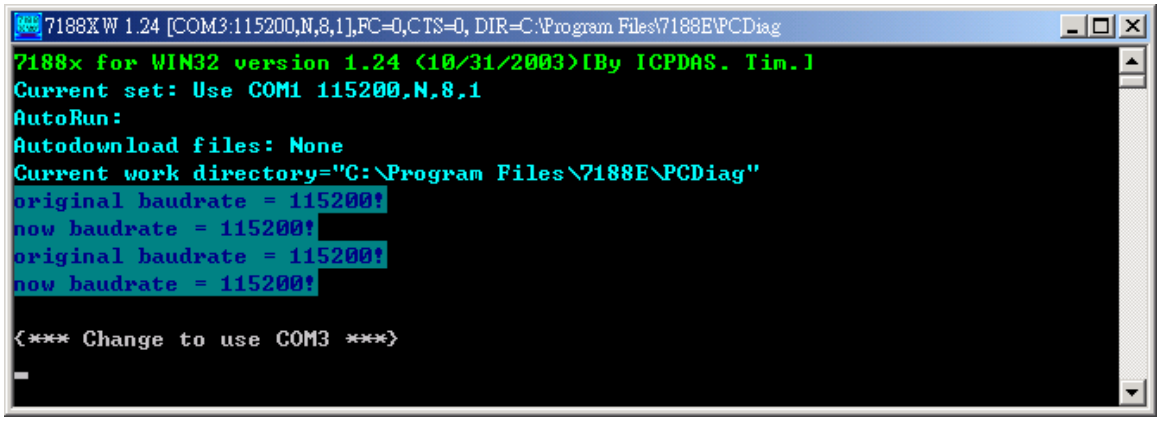
Step 2: I 7243D's COM1(RS-232 Port) to become PC's COM3 by using the VxComm Utility.



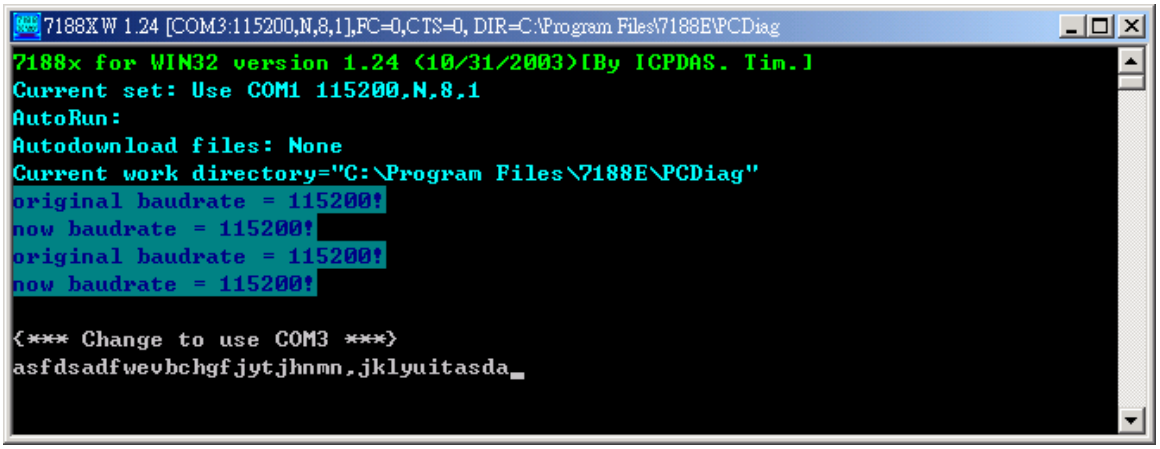
Step 3: Run the 7188xw.exe from the “Start / Run...” menu.



Step 4: Press the <Alt> + <3> keys to use PC’s COM3.
It will show “{*** Change to use COM3 ***}” message after changed.

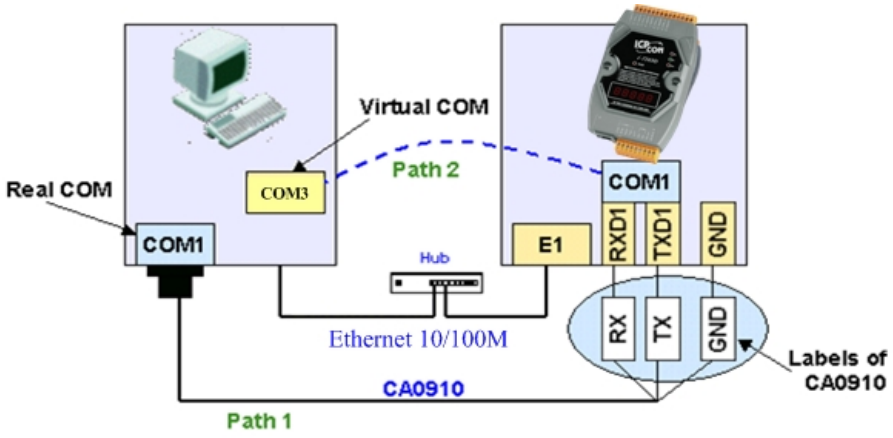

7188XW 1.24 [COM3:115200,N,8,1],FC=0,CTS=0, DIR=C:\Program Files\7188E\PCDiag
7188x for WIN32 version 1.24 (10/31/2003)[By ICPDAS. Tim.]
Current set: Use COM1 115200,N,8,1
AutoRun:
Autodownload files: None
Current work directory="C:\Program Files\7188E\PCDiag"
original baudrate = 115200!
now baudrate = 115200!
original baudrate = 115200!
now baudrate = 115200!
{*** Change to use COM3 ***}

Step 5: Type some characters in the 7188xw.exe window.
The characters will be sent from PC’s COM3 to I-7243D’s COM1 (through Path1), and immediately returned from the I-7243D’s COM1 to the PC’s COM3 (through Path2) then shown on the PC’s monitor.

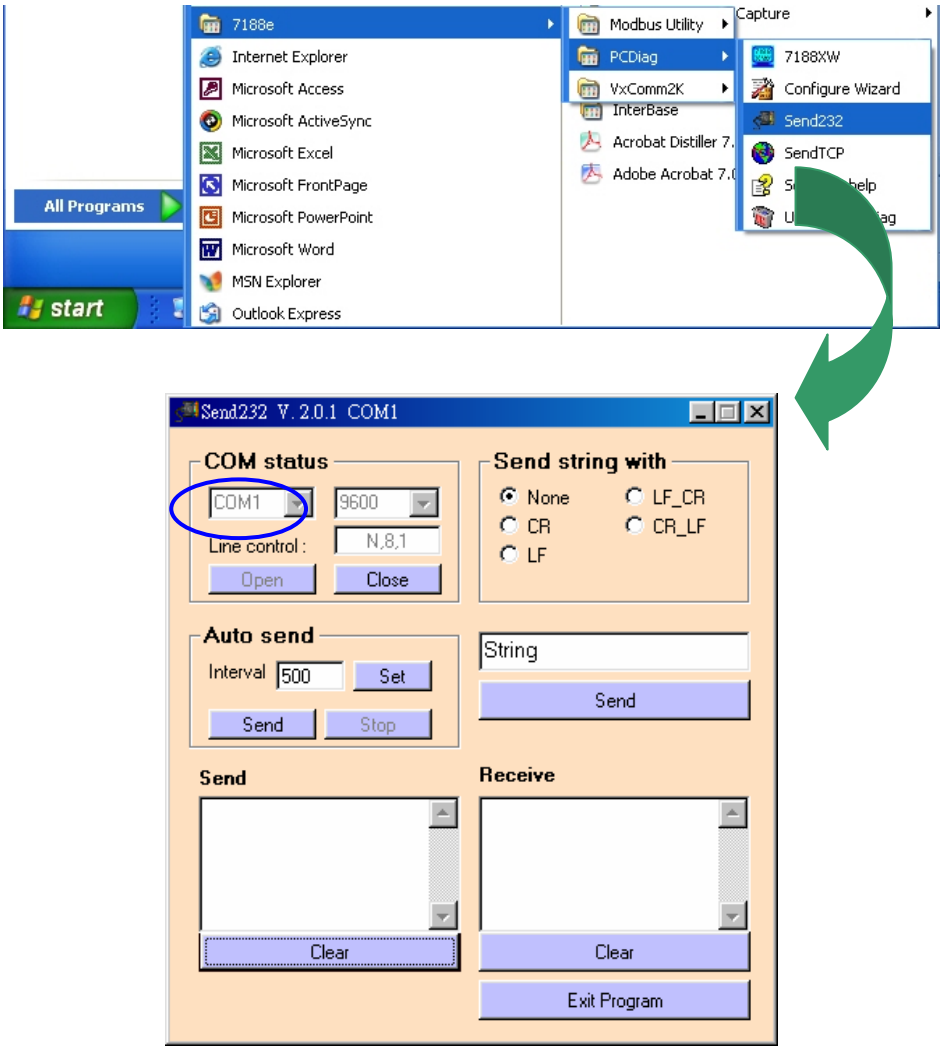

7188XW 1.24 [COM3:115200,N,8,1],FC=0,CTS=0, DIR=C:\Program Files\7188E\PCDiag
7188x for WIN32 version 1.24 (10/31/2003)[By ICPDAS. Tim.]
Current set: Use COM1 115200,N,8,1
AutoRun:
Autodownload files: None
Current work directory="C:\Program Files\7188E\PCDiag"
original baudrate = 115200!
now baudrate = 115200!
original baudrate = 115200!
now baudrate = 115200!
{*** Change to use COM3 ***}
asfdsadfwevbchgfjytjhnmn,jklyuitasda

■ Example 2: Close-Loop Testing

Step 1: Build connection as follows:



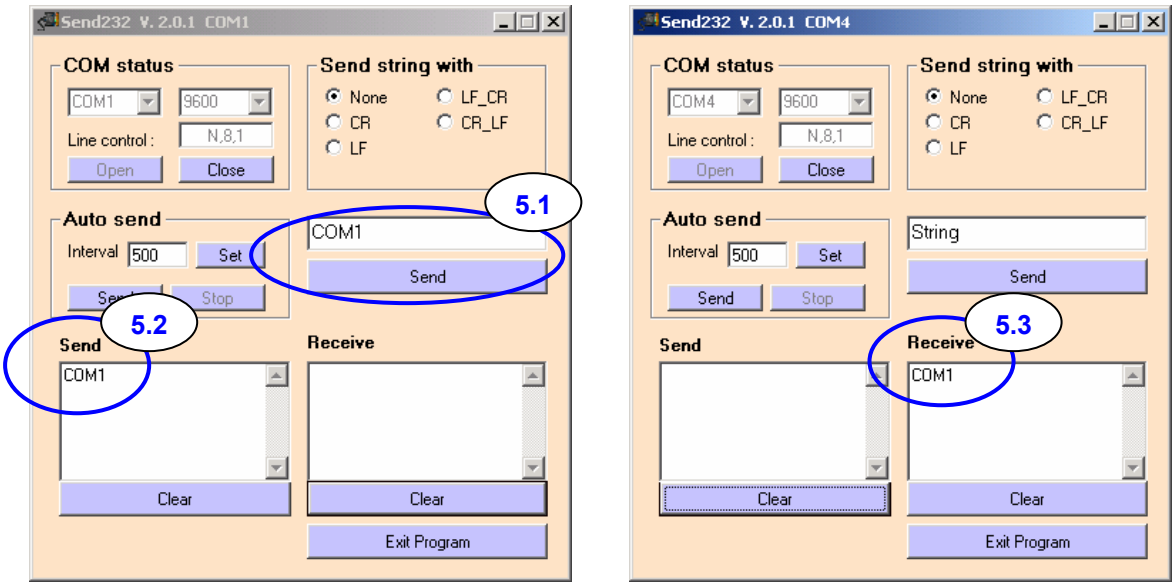
Step 2: Run Send232 and then open PC's COM1.



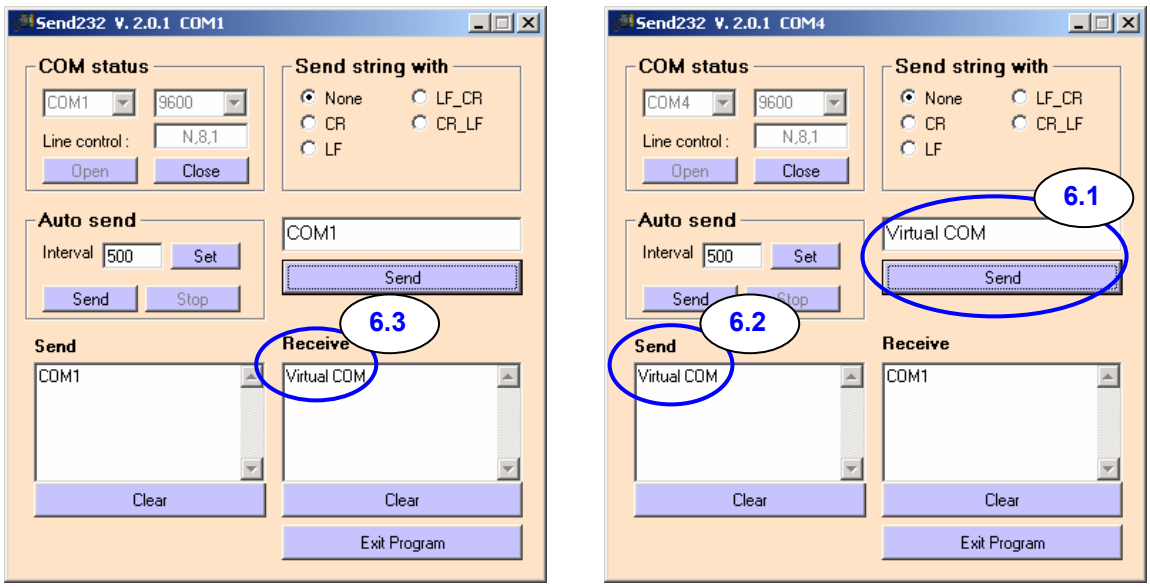
Step 3: Let I-7243D's COM1 to become PC's COM4 by using the VxComm Utility.

Step 4: Run another Send232 and open PC's virtual COM3.

Step 5: Type "COM1" in left hand window, and press "Send".
Data will be sent from PC's COM1 through Path1 to I-7243D's COM1 and immediately returned through Path2 to PC's COM4.



Step 6: Type "Virtual COM" in right hand window, and press "Send".
Data will be sent from PC's COM4 through Path2 to I-7243D's COM1 and immediately returned through Path1 to PC's COM1.



8.2 Troubleshooting

Problem 1: Client program fail to open the COM port that was created by the VxComm Driver.

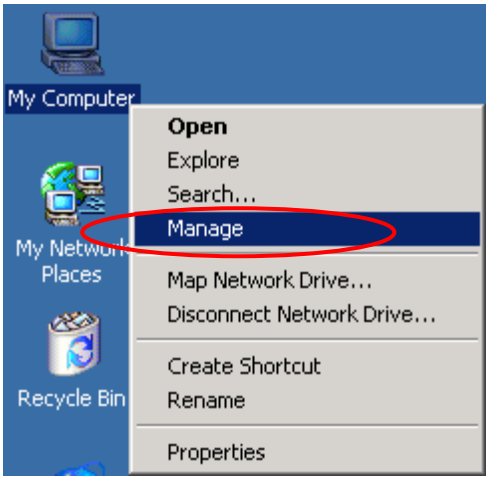
Check:

The I-7243D's power supply, network cable, IP address, subnet-mask and gateway.

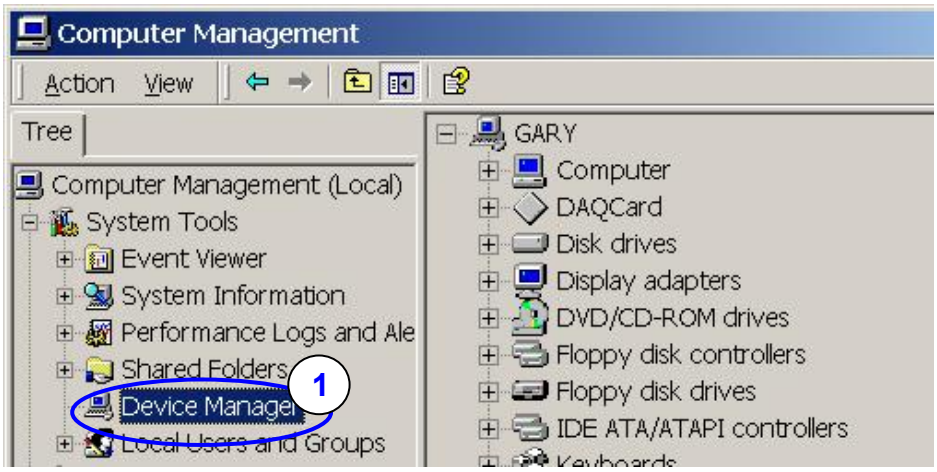
Problem 2: Client program still fails to open the COM port.

Check:

Step 1: Right click the "My computer" icon and select the "Manage" option.

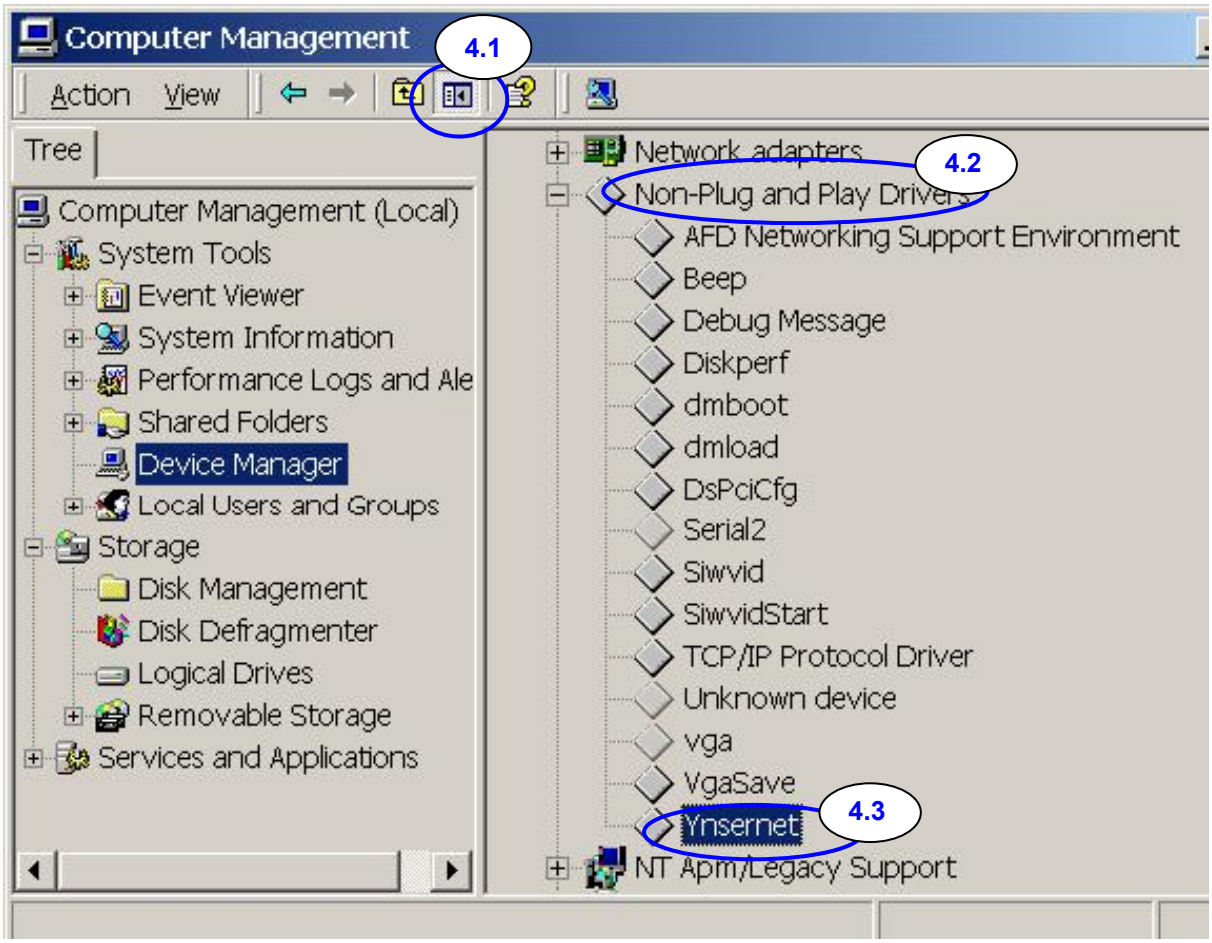


Step 2: Select the "Device Manager" icon from the "Computer Management" program.



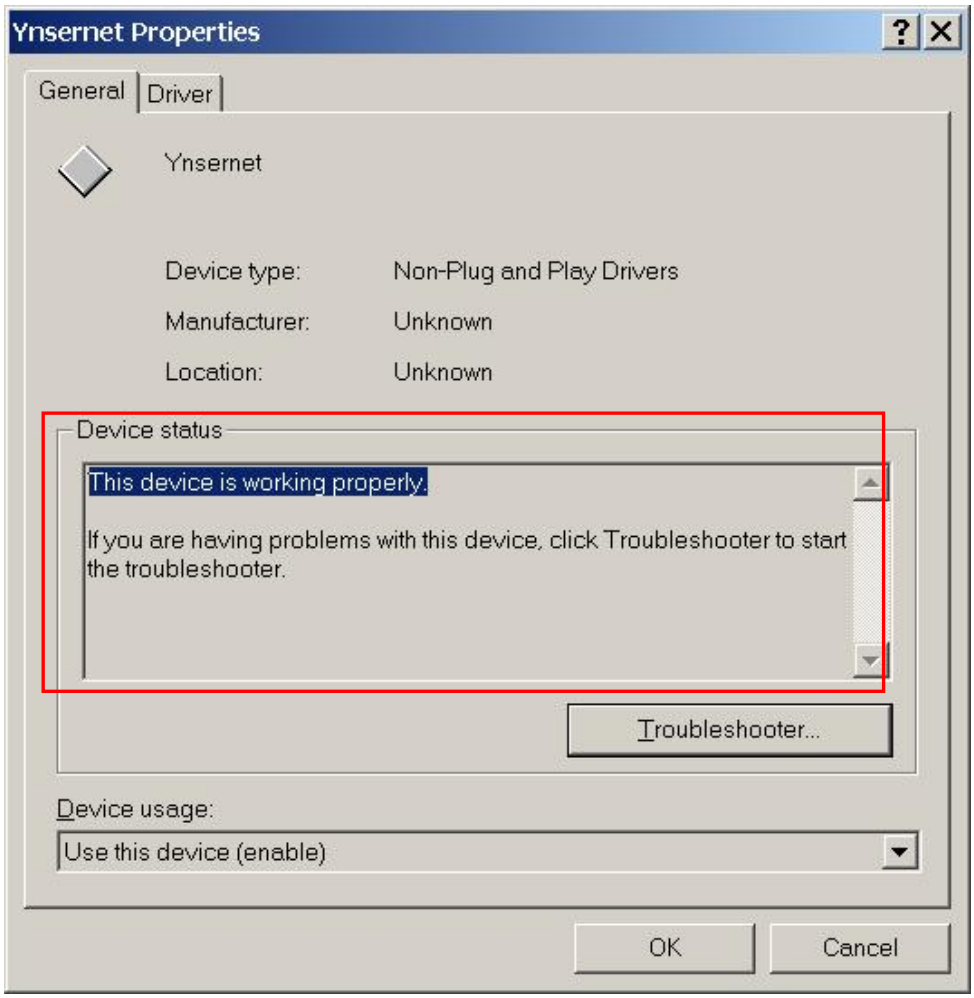
Step 3: Click the menu item "View / Show hidden devices".

Step 4: Select the item "Non-Plug and Play Drivers / Ynsernet".



Step 5: Right click the mouse button on the "Ynsernet" item and select the "Properties" menu item.

Step 6: Check if it shows the message "This device is working properly."
If the driver does not work properly, please remove it and then re-install and configure it again.



Problem 3: Client programs open the COM port with success, but fail to access the device.

Check:

Check the device's power supply and wiring (RS-232: RXD, TXD; RS-485: D+, D- ; GND ...).

Appendix A: Connection Status Table

Connection Type	Status values(decimal)	Description
	0	Initial Status
Explicit Connection	1	Establish OK
	2	Establishing
	3	Un-establish
	4	WDT un-setting
	5	WDT setting OK
	6	WDT setting
	7	Establish OK, wait for IO
Bit-Strobe Connection	10	Establish OK
	11	Establishing
	12	Un-establish
	13	Wait for produced connection size response
	14	Get produced connection size response
	15	Un-set EPR
	16	EPR setting OK
	17	EPR setting
Polling Connection	20	Establish OK
	21	Establishing
	22	Un-establish
	23	Wait for consumed connection size response
	24	Get produced connection size response
	25	Wait for consumed connection size response
	26	Get produced connection size response
	27	Un-set EPR
	28	EPR setting OK
	29	EPR setting

COS/Cyclic Connection	30	Establish OK
	31	Establishing
	32	Un-establish
	33	Wait for consumed connection size response
	34	Get produced connection size response
	35	Wait for consumed connection size response
	36	Get produced connection size response
	37	Un-set EPR
	38	EPR setting OK
	39	EPR setting
	40	ACK response message error
	41	NO ACK response message

Table A: Connection Status Table

Appendix B: Command Table

Status values(decimal)	Description
0	No command
1	Checking “Allocate Response”
2	Checking “Set WDT Response”
3	Checking “User Get Attribute Response”
4	Checking “User Set Attribute Response”
5	Checking “Set Fragment Attribute Response”
6	Checking “Release Bit-Strobe Response”
7	Start to Update IO Connection
8	Sending “Allocate Explicit Connection Request”
9	Sending “Release Explicit Connection Request”
10	Sending “WDT Action Request”
11	Sending “Get Attribute Request”
12	Sending “Set Attribute Request”
30	Sending “Allocate Bit-Strobe Connection Request”
31	Checking “Allocate Bit-Strobe Connection Command”
32	Sending “Bit-Strobe Get Produced Size Request”
33	Checking “Bit-Strobe Get Produced Size Response”
34	Sending “Bit-Strobe Set EPR Request”
35	Checking “Bit-Strobe Set EPR Response”
36	Sending “Release Bit-Strobe Connection Request”
37	Checking “Release Bit-Strobe Connection Response”
38	Checking “Bit-Strobe IO Response”
50	Sending “Allocate Poll Connection Request”
51	Checking “Allocate Poll Connection Response”
52	Sending “Poll Get Produced Size Request”
53	Checking “Poll Get Produced Size Response”
54	Sending “Poll Get Consumed Size Request”
55	Checking “Poll Get Consumed Size Response”
56	Sending “Poll Set EPR Request”
57	Checking “Poll Set EPR Response”
58	Sending “Poll Output Data Command”
59	Checking “Poll Input Data Command”
60	Sending “Release Poll Connection Request”

61	Checking “Release Poll Connection Response”
70	Sending “Allocate COS/Cyclic Connection Request”
71	Checking “Allocate COS/Cyclic Connection Request”
72	Sending “COS/Cyclic Get Produced Size Request”
73	Checking “COS/Cyclic Get Produced Size Response”
74	Sending “COS/Cyclic Get Consumed Size Request”
75	Checking “COS/Cyclic Get Consumed Size Response”
76	Sending “COS/Cyclic Set EPR Request”
77	Checking “COS/Cyclic Set EPR Response”
78	Sending “COS/Cyclic Output Data Command”
79	Checking “COS/Cyclic ACK Response”
80	Checking “COS/Cyclic Input Data Command”
81	Sending “Release COS/Cyclic Connection Request”
82	Checking “Release COS/Cyclic Connection Response”
83	Sending “COS/Cyclic Instance 2 EPR Request”
84	Checking “COS/Cyclic ACK Response”

Table B: Command Table

Appendix C: Result Table

Status values(decimal)	Description
0	No Result
1	“Allocate Response” OK
2	“Allocate Response” Error
3	“Allocate Response” Timeout
4	“Set WDT Action Response” OK
5	“Set WDT Action Response” Error
6	“Set WDT Action Response” Timeout
7	“Release Connection Response” OK
8	“Release Connection Response” Error
9	“Release Connection Response” Timeout
10	“Get Attribute Response” OK
11	“Get Attribute Response” Error
12	“Get Attribute Response” Timeout
13	“Set Attribute Response” OK
14	“Set Attribute Response” Error
15	“Set Attribute Response” Timeout
16	“Set Attribute ACK Response” Timeout
20	“Set Bit-Strobe Connection EPR Response” OK
21	“Set Bit-Strobe Connection EPR Response” Error
22	“Set Bit-Strobe Connection EPR Response” Timeout
23	“Set Bit-Strobe IO Request” OK
24	“Set Bit-Strobe IO Request” Error
25	“Set Bit-Strobe IO Request” Timeout
26	“Get Bit-Strobe Produced Size Response” Error
27	“Get Bit-Strobe Produced Size Response” Timeout
28	“Setting of Bit-Strobe Input Data Length” Error
30	“Set Poll Connection EPR Response” OK
31	“Set Poll Connection EPR Response” Error
32	“Set Poll Connection EPR Response” Timeout
33	“Set Poll IO Request” OK
34	“Set Poll IO Request” Error
35	“Set Poll IO Request” Timeout
36	“Get Poll Produced Size Response” Error

37	“Get Poll Produced Size Response” Timeout
38	“Setting of Poll Input Data Length” Error
03	“Get Poll Consumed Size Response” Error
40	“Get Poll Consumed Size Response” Timeout
41	“Setting of Poll Output Data Length” Error
50	“Set COS/Cyclic Connection EPR Response” OK
51	“Set COS/Cyclic Connection EPR Response” Error
52	“Set COS/Cyclic Connection EPR Response” Timeout
53	“Set COS/Cyclic IO Request” OK
54	“Set COS/Cyclic IO Request” Error
55	“Set COS/Cyclic IO Request” Timeout
56	“Set COS/Cyclic ACK Request” OK
57	“Set COS/Cyclic ACK Request” Error
58	“Set COS/Cyclic ACK Request” Timeout
59	“Get COS/Cyclic Produced Size Response” Error
60	“Get COS/Cyclic Produced Size Response” Timeout
61	“Setting of COS/Cyclic Input Data Length” Error
62	“Get COS/Cyclic Consumed Size Response” Error
63	“Get COS/Cyclic Consumed Size Response” Timeout
64	“Setting of COS/Cyclic Output Data Length” Error

Table C: Result Table